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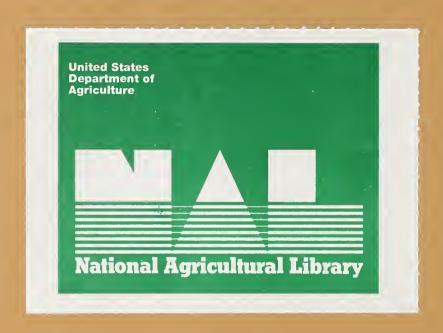
Watershed and Air Management Staff Washington D.C.



December 1987

# Soil and Water Resource Management: A Cost or A Benefit?

Approaches to Watershed Economics Through Example



## SOIL AND WATER RESOURCE MANAGEMENT:

A COST OR A BENEFIT?

# APPROACHES TO WATERSHED ECONOMICS THROUGH EXAMPLE

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USDA Forest Service Watershed and Air Management Staff Washington, D.C.





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# Approaches to Watershed Economics Through Example

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Special appreciation is also extended to all Regional Watershed Directors, Supervisor's Offices, Research units, and individuals who participated in this effort.

#### EXECUTIVE SUMMARY

Stewardship of soil and water resources is recognized by many and is addressed by legislation. However, many people view watershed management as a cost with no economic benefits. Recent research and analyses have demonstrated that the way soil and water are managed can make significant differences in growth and yields of timber, in forage production, in fish biomass, in enhanced water related values and resources downstream, and in road construction and maintenance costs.

A National effort has developed analysis procedures for estimating the economic benefits of soil and water resource management. The National effort focused on 5 emphasis areas: timber, forage, fish, enhanced water, and road construction and maintenance. The benefits are increments of increased timber, forage, and other resources from improved soil and water resource management. The procedures can be applied to recreation, wildlife and other soil and water dependent resources. The report discusses these procedures, and the data and information requirements to employ the procedures.

The procedures and economics of soil and water management are demonstrated by 16 examples. Examples were developed for all emphasis areas and for all regions of the country.

The interrelationships between soil and water and other related land resources are embedded in watershed management. Watershed management practices or projects illustrated by report examples, include:

- 1) rehabilitation practices aimed at correcting past land use actions;
- 2) protection practices to maintain, sustain, augment, or enhance current or future land uses; and
- 3) integration of watershed practices aimed at sustaining or enhancing upland productivity (while preventing adverse on-site or downstream impacts) into other resource development actions.

This report provides a workable framework discussing a set of economically feasible watershed practices/projects which have been applied on National Forest lands. Most of the examples presented demonstrate positive returns from investments in soil and water resource management.

A few examples evaluated practices that were not cost effective for a specific site and management situation. However, these practices applied in another setting may prove to be cost effective.

These examples can assist others in quantifying and evaluating the economics of water and related land resource practices and projects. Such analyses will aid in prioritizing projects or practices for funding to gain the greatest economic efficiency.

In the examples, incremental outputs and values of induced goods and services attributable to investments in the management of soil and water resources on forest and range lands are identified. The examples provide insights into the

economic implications and impacts of watershed management and other related land resource activities, practices, and projects.

Forest resources are being managed in an integrated manner. The procedures allow analysis of multiresource responses and economics of soil and water management activities.

The report contains procedures and information that will be useful to a wide variety of agencies, industry, private landowners, universities, forest managers, and consultants. It contains data and procedures that will assist in agency program and budgeting processes.

Research needs are identified to advance the development of the economics of soil and water resource management.

The bibliography contains over 700 references, which have been classified as what types of data or information they contain and where such information fits in the analysis procedures presented in the report. The bibliography will provide a good starting reference for analyses in various regions of the country.

#### PREFACE

Stewardship of soil and water resources is recognized by many, and is addressed by legislation. However, many people view watershed management as a cost, with little or no direct economic benefit. Recent research and analyses have demonstrated that the way soil and water are managed can make significant differences in growth and yields of timber, in recreation use, in fish biomass, in forage production, in water treatment costs, and in road construction and maintenance costs.

Several factors brought about recognition of the serious need to develop information about the costs and benefits of soil and water resource management.

In April, 1986, at a Watershed Directors' meeting, the Director of Watershed and Air Management Staff (Washington Office) and the Regional Watershed Directors considered several related issues:

first, in recent years the economics of natural resource management has become a major national issue;

second, forest land management planning includes economic evaluations of resource management alternatives;

third, the National Debt issue has raised questions of benefit/cost concerning investments in natural resource management, especially concerned with "below cost" timber sales and returns to the Treasury; and

finally, private and industrial landowners need demonstrated economic returns over the costs of investing in soil and water management.

To help address these and other issues, the economics of soil and water resource management need to be quantified. A variety of Federal, state and local agencies, forest industry, universities, and interest groups have also expressed a need for procedures, information, and demonstration examples for economics of soil and water resource management.

As a result, a national effort was initiated to quantify the economic benefits of soil and water resource management.

An interdisciplinary team was established to develop the economics of soil and water resource management. The interdisciplinary team included an economist, a forester, two hydrologists, a range economist/conservationist, and a soil scientist representing the Washington, Regional, and Forest levels of the Organization. The National Forest System and State and Private Forestry were represented on the team.

The team was charged with demonstrating the economics of soil and water resource management through examples. Team members searched for available reports from National Forests, state foresters, and industry; conducted literature searches; and constructed examples from available data, information and models.

The product is this report, containing procedures for making economic analyses; presenting examples of economic analyses demonstrating the methodologies; identifying sources of information; and recommending follow-up actions.

The report provides information and procedures useful to a wide variety of potential users. The Washington Office, Regional Offices, and individual National Forests can use the report in watershed program planning, prioritizing tasks, implementing forest plans, documenting the induced resource outputs from soil and water management, and determining the economic benefits of soil and water management. State and Private Forestry units and state foresters can use it in program planning and administration, and in transferring soil and water conservation technology to forest industry and to the small private landowners.

The report also identifies research needs. If Forest Service Research, universities, and other agencies conduct studies in these areas, soil and water resource management will be strongly advanced.

#### OVERVIEW OF TEAM EFFORT

## Charter Statement and Guiding Principles

Soil and water are the basic resources. They are essential to the production of all forest and range land products and services.

The amount of goods and services that will be produced on these lands directly depends on the manner in which the soil and water resources are managed, conserved, and used.

These resources and services have economic value, which vary to the extent that they are in limited supply and meet human needs. Through specific examples, this "Economic Values of Soil and Water Resource Management" project identified incremental outputs and values of induced goods and services that can be attributed to investments in soil and water resource management on forest and range lands.

The team limited the effort to five emphasis areas: timber, forage, fisheries, enhanced water, and roads. The procedures developed to evaluate the economics of watershed management in these five emphasis areas are also applicable to other resource analyses.

Generally, the project emphasized comparing the value of goods and services produced (or conserved) with costs incurred. Therefore, examples of induced outputs or benefits (goods and services) at local and regional levels resulting from investments in soil and water resource management in timber, forage, enhanced water and fisheries, and cost savings associated with roads were examined.

An induced benefit is a primary benefit incidental to the objectives of the policy, program or project. The term induced outputs, as used in this report, refers to the increment of increased (or decreased) direct or indirect output of goods and services attributed to soil and water resource management.

For the purposes of this project, the concept governing induced costs and benefits (in accordance with Forest Service policy) is that the resource activity or program that incurs the costs accounts for the benefits derived.

Thus, if investments in soil and water management induce resource outputs, benefits are attributed to soil and water management activities. Similarly, if timber management investments induce other resource outputs, that program is credited with producing the benefits. If several resource programs make interrelated investments in a project, all share credit for benefits derived.

Agency soil and water programs fund projects such as watershed improvements, watershed rehabilitation, skid trail and road rehabilitation, and quantifying and securing (through special use permits and water rights) instream flows. All induced outputs of timber production, forage, fisheries, enhanced water, and savings in road costs induced by these investments are claimed by the agency's soil and water programs.

Often agency soil and water programs include technical assistance and advice to timber, range, fisheries and other resource management. Technical assistance

includes making soil and water prescriptions, reviewing timber management prescriptions, providing soil interpretations, and a variety of similar inputs. Thus, soil and water makes investments in multiple-use management. Soil and water technical assistance can be credited with a portion of the timber, forage, and other resource outputs induced by implementing the recommended soil and water resource management.

Induced outputs are quantified by comparing resource outputs between sites where soil and water management was implemented with sites where it was partially or not implemented.

Cost information for soil and water resource management came from 1) investments in soil and water projects and 2) costs associated with technical assistance to other resource management projects.

To be usable for this project, examples had to meet two criteria:

1) investments in soil and water resource management were made in the project; and 2) identifiable induced outputs resulted from implementing soil and water resource management.

## Literature Search

Information and assistance were requested from Regional Foresters, the Director of the Northeastern Area, and others in a letter from the Chief of the Forest Service. Next, contact persons were established at each of the Regional and Area Offices, and team members met with each one to discuss the project and to define the type of data, information, and reports needed.

A slide program was used to demonstrate the types of resource and economic analyses to be developed by the team. Regional contacts then worked with National Forest Supervisor's Offices, state foresters, research units, and universities to locate data, papers, reports, or examples of economic analyses that showed potential for use in this project.

A questionnaire was developed to assist in requesting literature and reports from the various sources.

The Rocky Mountain Forest and Range Experiment Station in Fort Collins, Colorado established a position to conduct literature searches, assemble reports from the Regions, catalogue materials found and received, support the team with information needs, and develop the bibliography.

The literature search was limited to five emphasis areas: timber, forage, fisheries, enhanced water, and roads. To assist in the literature search, a matrix was developed for each area.

These matrices are briefly described the Matrices subsection of this section, and in complete detail in APPENDIX A. The matrices have rows and columns (see Table 1). The columns identify types of data or procedures needed for an economic analysis. The rows are soil and water related practices for which data or procedures were to be found and used in the analysis. The intersection of a row with a column is a cell in the matrix.

The literature searches were structured to locate information, data, or procedures pertinent to each cell in the matrix. Computer literature searches were not very fruitful, because available key words were too general and did not reflect the specific needs associated with each cell. Most of the useful literature was located by reading Forestry Abstracts to determine if the paper contained useful information.

The Regional contacts, team, and National Forest personnel located many papers and reports, although the majority of the papers were located through the literature search. Through this combined effort, over 700 publications were located and catalogued. There is no easy way to locate this type of information. It requires rigorous review of reports, digging into the abstracts, and spending large blocks of time in the library.

## Matrices

Five matrices were developed to estimate the economic benefits from soil and water resource management for the emphasis areas. These matrices served three functions. They: 1) directed the literature searches; 2) governed the cataloguing of papers; and 3) served as a framework for projecting the induced outputs and economic benefits from soil and water resource management.

To illustrate the matrices, a simplified timber matrix (Table 1) is discussed here. Two Southern soil and water related timber management practices are compared: site preparation for tree planting, using disking, and chop and burn practices (column 1). Further explanations of the information in each column follow the table.

Table 1. Simpli:	Table 1. Simplified timber matrix.							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
Soil & water	Stock'g	S&S	P&S	Ht.	G&Y	Induced	Economi	cs_
related	level	growth	growth	growth	yield	res.	B C B/C	IRR
practice	(%)	(Ft.)	(Ft.)	curves	tables	output	\$ \$	%_
Site prep.								
Disking	%	Ht.	Ht.	R	Ya			
Chop & burn	%	Ht.	Ht.	R	Yb	Yb-Ya	\$ \$ B/C	%

Note that disking usually follows shearing and windrowing, which removes nutrients and topsoil to windrows and often reduces soil productivity. Chopping followed by a cool burn leaves more nutrients in place, and better maintains soil productivity. To evaluate timber resource output differences between treatments, the following information and analysis tools are needed.

The type of site preparation practice can affect initial stocking levels (column 2). To determine if both treatments produce adequate stocking levels throughout the rotation, the future stocking levels can be estimated using stocking versus age curves.

Seedling and sapling height growth can be different between these two site preparation practices (column 3). Seedling and sapling height growth data is

available in the literature for these practices for specific timber types and sites.

Sometimes the literature contains data on pole and sawtimber height growth differences between site preparation treatments (column 4). Using height growth curves (R in column 5), rotation height can be estimated from early stand height.

Estimated stocking levels and rotation stand height can be entered into growth and yield tables (column 6) to estimate wood volumes at the end to the rotation. The estimated wood volume for disking is yield A (Ya), while chop and burn should yield B (Yb). Assuming disking produces less wood volume than chop and burn, the induced timber output from better soil productivity maintenance is yield B minus yield A (Yb-Ya in column 7).

The increment of induced timber volume (Yb-Ya) has a stumpage value that is discounted to a net present value or a benefit (B) in column 8. The cost of site preparation and management over the rotation is adjusted to a present cost (C) in column 8.

A benefit/cost ratio (B/C) is computed, as well as an internal rate of return (IRR) (column 8).

This type of analysis quantifies the interactions between resource outputs and soil and water management. It reveals the worth of soil and water resource management in terms of timber and other resource outputs. It can demonstrate which soil and water related practice should produce the most goods and services from forest land.

# Standard Analysis Procedures

The team reviewed the accumulated literature and reports, and developed standard analytical procedures. Information from the literature search led them to revise matrices as needed. Next, based on available literature, examples were selected for development.

The examples followed the processes outlined by the matrices and used established resource analysis procedures. If a Forest Service Regional Office had models to evaluate resource responses, these models were utilized.

For example, if a soil and water related practice influenced site index, then a Regional timber growth and yield model was used to estimate growth and yield differences between practices. The team developed several examples to demonstrate how the matrices are used, the types of data and procedures needed, and the kind of results the analysis procedures produce.

## APPLICATION OF ECONOMIC MATRICES TO OTHER RESOURCES

Soil and water resource management induces outputs in recreation, wildlife, and other resources. The matrices and analysis procedures developed for the five emphasis areas demonstrate methods of economic analyses that can be applied when evaluating the interactions of soil and water management actions with other resource management activities.

The procedures presented in this report may not fit the needs of every situation. This should not prevent evaluating the induced outputs and cost savings for a new situation, as the procedures and concepts can be adapted.

The value of the matrices and examples is the demonstration of the concepts, data sources needed, and approaches to determining the economics of soil and water resource management.

## ECONOMIC ANALYSIS

All but one of the examples in this report are subjected to three standard investment analysis criteria: Internal Rate of Return, Present Net Value, and Benefit/Cost Ratio.

The costs and benefits of each example are presented in terms of early to mid-1980 dollars, thus each analysis is in real terms. Future costs and benefits are impacted by general price inflation to the same degree, hence inflation is a constant and cancels itself out.

The examples reflect only the increases in purchasing power of the investments. Accordingly, conscious effort was made to select a reasonable discount rate expressed in real terms.

A 4 percent rate was chosen for two basic reasons:

- 1) it is the rate the Forest Service uses when evaluating for internal purposes; and
- 2) it is a reasonably good rate to apply in cases typical of industrial and nonindustrial private landowners.

It should be understood, however, that there is nothing sacred about a 4 percent discount rate. A rate was needed to show the quantitative examples.

Even though 4 percent is widely used and defensible, other rates could have been used, as long as they were in real terms (that is, do not contain any inflation), and reasonably reflected the likely real rate increases that will be in effect in the economy (during the time span inherent in the problem being analyzed).

Selected evaluation terms and their definitions (based upon Forest Service Handbook 1909.17):

Internal Rate of Return (or rate of return in FSH 1909.17) is the discount rate that makes the present benefit value equal the present cost value. It is the capital growth rate while invested in the project.

<u>Discount Rate, Real.</u> A discount rate adjusted to exclude the effects of inflation.

<u>Discount Value</u>: A method used in project evaluation to discount future costs and benefits to the present.

<u>Present Net Value</u> is the present benefit value of the stream of benefits less the present cost value of the schedule of costs.

Benefit/Cost Ratio is the present benefit value divided by the present cost value.

Methodology. Methodology for economic and social analysis used in this report is based on standard economic principles employed in economic efficiency analysis. Concepts and principles have been extrapolated from standard economic texts in to Forest Service manuals and handbooks. These are: Forest Service Manual (FSM) 1970, Economic and Social Analysis; Forest Service Handbook (FSH) 1909.17, Economic and Social Analysis Handbook; FSH 2209.11, Range Project Effectiveness Analysis Handbook, and FSH 2509.15, Watershed Improvement Handbook.

The "Watershed Economic Examples" presented in the report are applications of the concepts and principles contained within these Forest Service directives. The examples rely on economic analysis methods involved in benefit/cost analysis, present net value, and internal rate of return.

Except for one or two exceptions, nonmarket benefits are not quantified or valued. While it was not the intent of the authors to cover nonmarket outputs such as wildlife, fish, scenery, and so on, these values may be included in the cost effectiveness analysis of watershed projects or soil and water resource management. For more specific reference to the economic methods employed in the examples the reader may refer to the Forest Service directives cited, or standard economic texts on cost benefit (economic efficiency) evaluation.

#### INTEGRATED RESOURCE MANAGEMENT

The concepts, information, economic analysis procedures, and bibliography contained in this report are applicable to all phases of integrated land and resource management. The type and degree of integrated resource management will vary between agencies and landowners.

As projects are analyzed and designed, all resource benefits and costs need to be considered. To adequately address these concerns, the skills of resource specialists and economists are needed.

Resource specialists determine the costs and resource responses of soil and water management, and work with economists to determine resource outputs, direct and induced economic benefits, and costs. Economic benefits are valued through present net value, internal rates of return and benefit/cost analysis.

An example of integrated resource planning and economic analysis is the process used by the Forest Service in developing and implementing National Forest plans. The specific details regarding this process are found in Forest Service Handbook 1909.12, Land and Resource Management Planning Handbook.

The examples presented in this report deal with tangible soil and water benefits. The team recognizes that intangible benefits are important and should be included in comprehensive analyses of the economics of soil and water resource management. The following examples were developed from data and reports supplied to the team. Most did not address intangible benefits—in fact only one of the examples supplied directly addresses them.

The team recognizes that soil and water management affects a variety of resource outputs. Again, most of the data and reports supplied evaluated only a single resource response to a soil and water treatment. A few analyses did evaluate several resource outputs from soil and water management.

Most examples outline the process used to estimate a single induced output between soil and water practices.

The process for evaluating a single resource response can be linked with several other processes to evaluate multiple resource responses for a set of soil and water practices. The five matrices presented in this report outline a variety of processes for evaluating induced outputs from soil and water management. The matrices and processes can be linked to perform a comprehensive analysis of resource interactions.

# EXAMPLES OF SOIL AND WATER RESOURCE MANAGEMENT AND ECONOMIC EFFICIENCY ANALYSIS

The following 16 examples demonstrate the application of the concepts, matrices, and analytical procedures discussed in previous sections. They are meant to stimulate thoughtful consideration of how the concepts and analytical procedures might be used to evaluate the economics of soil and water management situations.

The examples were solicited from various regions of the country, and specifically address the five emphasis areas. A majority of the examples emphasizes timber production, though other outputs such as forage, fish and wildlife, and reduced sedimentation are also identified and evaluated.

The examples are presented in summary or outline form, and are complete enough to show the analytical approach used. If outputs can be quantified and value, they should be included in the analysis. Note, however, in some of the examples, some market outputs that might be expected are not mentioned, and in only one or two examples are nonmarket outputs (such as aesthetics and wildlife) valued. It is not the purpose of this report to suggest that measurable market and nonmarket outputs be ignored or excluded from consideration.

## Format of the Examples:

Title: Describes the example. Source: Source of the example.

Problem: A statement of the problem and/or objective of the analysis.

Identifies resource management opportunities or losses being incurred.

Soil and Water Involvement: Here, how soil and water resource management contributed to the resolution of the problem is briefly described.

Approaches to Solution: Possible solutions or approaches to solving the problem are discussed.

Economics: Tables or narratives, including information on data inputs, timing of resource outputs, dollar investments and benefits, cost schedules, present net values, benefit/cost ratios, and internal rates of return are presented.

Conclusions: Interpretations of economic analysis and resource management. References: Literature citations.

For complete documentation of each example, specific references supporting each example are given. In some cases, examples are based on a specific situation. Outputs are presented for that specific situation, but the economic analysis was revised to conform with procedures established by the team.

Example 1: <u>Title</u>: Soil and Water Resource Management In Road Construction and Maintenance.

Source: Eastern Region, USDA Forest Service.

## Problem:

Soil and water resource management needs to be included in road location, design, construction and maintenance.

This need applies to all classes of landownership. Roads constructed and maintained without soil and water resource management involvement may have unacceptable environmental impacts, cost more to maintain, possibly cost more to build, and (over time) may cost more to operate.

The main haul road to a timber sale was built across problem soils where the cutbanks yield excessive surface runoff and erode easily. Timber will be hauled over the road periodically for the next 20 years.

The volume of runoff from the cutbanks is sufficient to erode through the road surface and subgrade. To maintain access, repair of road surface and subgrade will be needed approximately every three years.

Soil and water resource management was not included in road location, design, and construction.

# Soil and Water Involvement:

A soil scientist could have mapped the soils, reviewed the road location in the field, made soil interpretations, assisted in the design of runoff and erosion control practices, and/or provided necessary training to foresters and engineers in soil and water resource management associated with roading.

#### Solution:

The road should have been constructed with midslope terraces in cutbanks and water diversion above cutbank. Slopes would have been seeded, fertilized, and mulched.

## Rationale:

The existing road is experiencing runoff and erosion damage to cutbank, road surface and road subgrade. Actual repair costs for maintenance (scheduled at three year intervals) are reported.

The continuing repair costs could have been eliminated if erosion and runoff control structures had been designed and constructed in and above the cutbanks. Projected construction costs are based upon actual construction data for similar projects on National Forest land.

## Economics:

Current situation: haul road built without soil and water support. Repair costs are as follows:

## A. Equipment costs:

1.	10-yard dumptruck, lowboy,						
	and operator	\$30/hr.	x	6	hrs.	=	\$180
2.	Frontend loader, operator	\$35/hr.	x	3	hrs.	=	105
3.	Bulldozer, operator	\$40/hr.	x	2	hrs.	=	80
							\$365

## B. Materials

<ol> <li>30 yards pit run gravel for subgrade fill</li> <li>20 yards of Class 5 surface gravel</li> </ol>	at $\$.75/y$ ard = $\$22$ at $\$5.00/y$ ard = $\frac{100}{\$122}$
C. Repair work supervision	\$10/hr.x 4 hrs. = \$40 \$40
	Total repair cost = \$527

These repair costs are projected to recur every three years, or six times over the 20-year expected life of the road. The discounted value of the costs of these six maintenances (to the time of original construction) is \$2,137, using a discount rate of 4 percent.

Alternative: Soil and water input into haul road design and construction, and construction of erosion and runoff control structures.

Cost of support services and structures:

A. Labor to construct mid-slope terraces and water diversions above cutbank			\$780
B. Material to revegetate cutbank, seed, fertilizer and mulch			120
C. Soil scientist support services	اه-	_	300 \$1,200

The additional \$1,200 cost at the time of construction would have eliminated the heavy maintenance every three years.

Considering the \$2,137 saved as a benefit from spending \$1,200 more at time of construction:

the internal rate of return from \$1,200 additional cost is 11.2 percent;

the present net value is \$937; and the benefit/cost ratio is 1.78 to 1.00.

# Conclusion:

The additional preventive construction cost at the time the road was originally built would have been strongly justified on economic grounds.

Example 2: <u>Title</u>: Benefits of soil and water input into the design for a road reconstruction project.

<u>Source</u>: Value Engineering Proposal Summary, 3 Forks Road Reconstruction, January 18, 1984, R-3, Apache/Sitgreaves NF, Dean Berkey, et al.

## Problem:

A proposal for reconstruction of 3.0 miles of existing single lane road to double lane with an aggregate surface. The new design was for 35 mph travel speeds and future designation as a Forest Highway. Design standards and cost estimates were based on the 1979 reconstruction of an adjacent section of the same road. The project required both protection of soil and water and maintaining low costs.

Estimated cost for the reconstruction, based on the 1979 experience, is \$796,000.

# Soil and Water Involvement:

A hydrologist was appointed as a member of the interdisciplinary team for the project. Technical contributions included a provision for steeper road bank cuts in soils of low erodibility and low revegetation potential, and a narrower road width, which would reduce construction costs while disturbing less soil.

# Approach:

The approach was simply to provide soil and water expertise on the interdisciplinary team for the project evaluation, and to incorporate into the design suggestions meeting watershed constraints and contributing to project objectives.

# Rationale:

Because of the knowledge and expertise brought to the team by the hydrologist, adjustments in design were made. These resulted in significant savings, met project objectives, and protected soil and water values.

# Economics:

Without Soil/Wate	r Input	With Soil/Water Input
Miles of Road	3.0	3.0
Reconstruction Costs	\$796,000	\$372,044
Soil/Water input costs	-	\$800
Immediate benefit (savings) of Soil/Water input	-	\$211,978

Long term benefits (road in place--no appreciable difference in annual costs).

# Conclusions:

This example shows a dramatic savings as a result of soil and water expertise.

Watershed input, which cost about \$800, resulted in 50 percent of the savings of \$423,956. While this example demonstrates an immediate savings benefit, often the positive economic benefits of soil and water input for most road construction/reconstruction projects come over the long term.

Considering "best management practices" for soil and water protection in road design results in longer life and less maintenance costs for roads. We often become preoccupied with the costs associated with the incorporation of these practices, neglecting to consider their short and long term benefits. These benefits should be included in any economic analyses for road projects.

Example 3: Title: Gully Restoration, Oconee Ranger District, Compartment 169

<u>Source</u>: USDA Forest Service. 1982. Gully Restoration, Oconee Ranger District, Compartment 169. File report, Chattahoochee-Oconee National Forest, Gainesville, Ga.

## Problem:

A large gully on land now part of the Oconee National Forest had formed when the land was still in agricultural use. The gully has been invaded by trees and brush, but has still not healed, and erosion and sediment yields are unacceptable. The area of the gully and adjacent land needing treatment is six acres.

# Soil and Water Involvement:

Soil and water specialists working with other resource specialists designed the restoration of the gully.

## Solution:

Three alternatives for rehabilitation are evaluated: high cost, low cost; and no action. Descriptions follow:

High cost rehabilitation: all timber and brush is cleared from the gully and surrounding area for soil material to fill and shape gully. Fill material is moved into the gully; terraces are constructed, and the gully shaped. After earthwork is completed, the entire area is ripped, disked, limed, fertilized, seeded, fertilized, and mulched. Project protection involves reseeding, refertilization and maintenance for three years after initial treatment, with loblolly pine planted over the entire area three years after the initial earth work.

Low cost rehabilitation: timber is not removed from gully, but is removed from the surrounding area. A ditch is constructed above the head of the gully, with runoff discharged onto a stable soil. The gully is fertilized and seeded with native vegetation. Maintenance is scheduled for three years, including fertilization, spot seeding and ditch repair. Loblolly pine is planted during the second year.

No action alternative: no rehabilitation treatment is provided. Timber is harvested and a plantation is established beyond a 15 foot buffer around the gully.

## Rationale:

Costs and benefits associated with restoration, resource management, and resource outputs are based upon District data and experience. The value for sediment reduction was set at \$5 per ton, based on reported dredging costs. Wildlife habitat values for different stand ages are

those used in the Forest Plan. The costs for gully restoration, maintenance, tree planting, thinning administration, and clearcut administration are based upon project experience and file data from the Forest.

Pulpwood and sawtimber volumes harvested by thinnings and clearcuts are based upon Forest data and models. The values for pulpwood and sawtimber are based upon stumpage values for timber sold by the Forest.

Economics: Restoration and management of old gullies requires several investments over several years. Returns from these investments occur throughout the first rotation of trees. The sequence of investments and benefits are outlined for each alternative (tables 2, 3, and 4).

Table 2. Economic analysis of high cost gully restoration.

	Investments			Benefits
		Cost		
Year	Description	\$/Ac	Year	Description and Revenue
			1	Sediment reduction: 24 tons at
0	Gully restoration	1,800		\$5/ton.
1	Maintenance	150	1-5	Wildlife habitat: 10 acres at
1 2 2 3	Maintenance	150		\$71/acre/year.
2	Tree planting	75	2	Sediment reduction: 27 tons at
	Maintenance	150		\$5/ton.
30	Thinning admin.	50	2-30	Visual condition: \$3/acre for
40	Thinning admin.	45		10 acres for 29 years.
60	Clearcut admin.	40	3-60	Sediment reduction: 30 tons at
			( 40	\$5/ton for 58 years.
			6-10	Wildlife habitat: 10 acres at
			44 00	\$41/acre for 5 years.
			11-20	Wildlife habitat: 10 acres at
			24 (0	\$3/acre for 10 years.
			21-60	Wildlife habitat: 10 acres at
				\$34/acre for 40 years. Under-
			0.0	story forage improves.
			30	Thinning: 0.68 thousand board
				feet (MBF)/acre at
				\$119/MBF; and 3.8 cunits
				(CCF) at \$11.55/CCF for
			li o	10 acres.
			40	Thinning: 0.96 MBF/acre at
				\$121/MBF; and 1.7 CCF/acre
			(-	at \$12.10/CCF for 10 acres.
			60	Clearcut: 10.2 MBF/acre at
				\$127/MBF; and 6.5 CCF/acre at
	nol mate of noturn: 1			\$13.31/CCF for 10 acres.

Internal rate of return: 1.9 percent.

Present net value at 4 percent: -\$934 per acre.

Benefit/cost ratio at 4 percent: 0.60 to 1.00

Table 3. Economic analysis of low cost gully restoration.

	Investments			Income
Year	Description	Cost \$/Ac.	Year	Description and Benefit
0	Gully restoration: Ditch	80	1	Sediment reduction: 6 tons at \$5 per ton.
		_	1 <b>-</b> 5	Wildlife habitat: \$71/acre for 5
1	Maintenance	60		years for 10 acres.
1 2	Tree planting (6 acres) Maintenance	171 60	2	Sediment reduction: 12 tons at \$5 per ton.
3	Maintenance	60	3	Sediment reduction: 18 tons at \$5
30	Thinning admin. (6 acres	) 33		per ton.
40 60	Thinning admin. (6 acres Clearcut admin. (6 acres		4	Sediment reduction: 24 tons at \$5 per ton.
	(3	, –,	5-30	Visual condition: \$1/acre for 10 acres for 26 years.
			5-60	Sediment reduction: 30 tons at \$5 per ton for 56 years.
			6-10	Wildlife habitat: \$41 per acre for 10 acres for 5 years.
			11-20	Wildlife habitat: \$3 per acre for for 10 acres for 10 years.
			21-60	Wildlife habitat: \$34 per acre for 10 acres for 40 years. Understory forage improves.
			30	Thinning: 0.68 MBF/acre at \$118/ MBF; and 3.8 CCF/acre at \$11.55/CFF for 6 acres. CFF for 6 acres.
			40	Thinning: 0.96 MBF/acre at \$121/ MBF; and 1.7 CCF/acre at \$12.10 CCF for 6 acres.
T	nal rate of return: 18 0 n		60	Clearcut: 10.2 MBF/acre at \$127/ MBF; and 6.5 CCF/acre at \$13.31/CCF for 6 acres.

Internal rate of return: 18.0 percent.

Present net value at 4 percent: \$885 per acre. Benefit/cost ratio at 4 percent: 3.0 to 1.0.

Table 4. Economic analysis of no action alternative for gully restoration

	Investments		Income					
Year	Description	Cost \$/Ac.	Year	Description and Benefit				
0 30	Tree planting (6 acres) Thinning admin. (6 ac.)	171 55	1-5	Wildlife habitat: \$71/acre for 4 acres for 5 years.				
40 60	Thinning admin. (6 ac.) Clearcut admin. (6 ac.)	30 27	6-10	Wildlife habitat: \$41/acre for 4 acres for 5 years.				
			11-20	Wildlife habitat: \$3/acre for 4 acres for 10 years.				
			21-60	Wildlife habitat: \$34/acre for 4 acres for 40 years. Understory forage improves.				
			30	Thinning: 0.68 MBF/acre at \$118/ MBF; and 3.8 CCF/acre at \$11.55/ CCF for 6 acres.				
			40	Thinning: 0.96 MBF/acre at \$121/ MBF; and 1.7 CCF/acre at \$12.10/ CCF for 6 acres.				
	nal rate of return: 12.3		60	Clearcut: 10.2 MBF/acre at \$127/ MBF; and 6.5 CCF/acre at \$13.31/ CCF for 6 acres.				

Present net value at 4 percent: \$316 per acre. Benefit/cost ratio at 4 percent: 2.66 to 1.00.

## Conclusions:

When selecting the best gully restoration alternative, factors other than pure economics determine the choice. In this situation, other factors to consider are the impacts on warm water fisheries and recreation values that might be affected by sediment.

Based on the economic analysis information displayed in tables 2, 3, and 4, the low cost alternative is the most cost-effective. It might be selected if the sediment yield was below the threshold to impair warm water fisheries and downstream recreation.

If warm water fisheries and recreation were impaired, or were issues with users, the low cost alternative is the most cost effective method to reduce sedimentation. The high cost alternative would be used to solve sediment impacts on high-value fisheries and recreational waters.

Example 4: Title: Restoring Soil Productivity by Respreading Topsoil.

Source: Pacific Southwest Region, USDA Forest Service

## Problem:

A problem common to all types of landownership is the impact of site preparation for tree planting on soil productivity. During the process of reducing vegetative competition for tree seedlings, litter and topsoil are sometimes removed and deposited in windrows.

Litter and topsoil contain a large portion of the nutrients needed by trees for growth to sawtimber size. Removing nutrients during site preparation can significantly reduce site productivity and timber yields. Including soil resource management in site preparation projects can help managers retain these nutrients, thus maintaining soil productivity and timber yields and benefiting the timber resource.

This example evaluates the effects on soil productivity and tree growth from the displacement of three or more inches of topsoil during site preparation activities. The site preparation project was designed to remove the seed source for competing plant species.

Tree increment core data reveals that plantations established with this type of site preparation suffer reduced height and volume growth during the 20 years following site preparation. Indications are that this reduced growth will probably persist through the rotation, reducing the future value of the harvest.

# Soil and Water Involvement:

A soil scientist can collect and analyze soil samples to determine what nutrients are available for plant growth. With information about the amount of topsoil displacement, the potential (undisturbed) productivity of the site can be determined, and estimates of the amount of soil productivity loss and subsequent tree growth loss can be made.

Analysis of mineralizable soil nitrogen allows the soil scientist to determine the approximate percentage of productivity loss (see the paper by Miles and Powers). To field-verify this relationship between soil productivity loss and and tree growth, increment core samples (to determine inches of radial growth over time) can be taken.

# Approaches to Solution:

Two options can be considered to reduce or eliminate this volume/value loss.

The first option is to rehabilitate the plantation by spreading displaced topsoil back to its original position and depth, so the pine

plantation can utilize the nutrients it contains. The second option is to fertilize the plantation every 10 years for the remainder of the rotation.

## Rationale:

The soil productivity decline is due to the mechanical removal of the topsoil. Estimated radial growth rate of tree is reduced by 35 percent compared to trees growing on undisturbed soil. Soil analysis of mineralizable soil nitrogen supports the assumption that growth loss is due to the lower availability of nitrogen where topsoil has been removed.

Using a stumpage value of \$1.27 per cubic foot for Ponderosa pine (based on data in the Modoc National Forest Plan), a 100-year rotation was used to compare timber growth and yields between options.

The resulting benefit in dollars per acre is a comparison of values for the three alternatives described in table 5. These values are the future value used in the economic analysis.

Table 5. Economic comparison of alternatives for restoring soil productivity.

	Do nothing	Topsoil redistribution	Fertilize every 10 yrs. Age 20-90
Original site productivity rsp <sup>3</sup> /ac./yr. at CMAI	55	55	55
Total potential volume ft. 3)	5,500	5,500	5,500
Stand productivity foregone (lost) during first 20 years growth; and continued loss if no treatment is used.	s 35%	7%	7%
Wood <sub>3</sub> volume at 100 years (ft. <sup>3</sup> /ac.)	3,575	5,115	5,115
Stumpage value/ft. <sup>3</sup> \$	1.27	\$ 1.27	\$ 1.27
Stumpage value at 100 years (ft. stumpage value x volume) (in dollars).	4,540	6,496	6,496
Resulting value of treatments at 100 years (in dollars).	-	1,956	1,956
Present (year 20) value of resulting values discounted at 4 percent	-	\$84.86	\$84.86
Mitigation costs/ac.	-	\$45.00 (at yr. 20)	\$60.00 at yrs. 20,30,40,50, 60,70,80,90.
Present 20 year value of mitigation costs.	-	\$45.00	\$176.91
Internal rate of		4.82%	2.74%
Present net value (at 4 percent; 20	) yr.)	\$39.86	\$ <b>-</b> 92.05
Benefit/cost rat (at 4 percent; 20		1.89:1	0.48:1

1 Culmination of Mean Annual Increment Conclusion: The topsoil redistribution rehabilitation investment shows:

a favorable benefit/cost ratio;

an IRR greater than the 4 percent alternative rate; and a positive present net value.

## References:

Miles, S.R. & Powers, R.F. "Fertilizing California Forests with Nitrogen - Preliminary Guidelines", November 1983, USDA Forest Service, Pacific Southwest Region, 14 pg., unpublished.

Luckow, K.R., "Plum Ridge Soil Improvement Project", March 1984, USDA Forest Service, Modoc National Forest, 10 pg., unpublished.

Example 5: <u>Title</u>: Reducing Watershed Damage and Regeneration Costs by Planting Seedlings in Logging Slash.

Source: Pacific Southwest Region, USDA Forest Service.

## Problem:

Broadcast burning of harvest areas is done by various landowners to:

- 1) reduce fuel hazard;
- 2) protect against wildfire through the next rotation; and
- 3) eliminate slash and competition for planting and survival of seedlings.

Broadcast burning has three soil and water problems associated with it. First, broadcast burns can escape and burn streamside management zones (SMZs). Burned streamside management zones are not as effective in protecting water quality. Second, burning on highly erodible soils increases erosion/sedimentation. Finally, burning may reduce soil productivity.

Costly mitigation measures can be used protect soil productivity and water quality that will increase the cost of site preparation for planting. An alternative slash reduction method is evaluated and compared to broadcast burning.

The alternative needs to reduce fire hazard, reduce regeneration costs, protect soil productivity, and protect water quality.

## Soil and Water Involvement:

The soil scientist and hydrologist integrate soil and water resource management into project plans, while meeting the needs of timber resource management. Soil moisture/plant relationship information was utilized in generating alternatives and modifying alternatives to maximize the probability of seedling survival.

# Approaches to Solution:

Recently, a "no-burn alternative" for site preparation for seedling establishment has received much attention.

Research in Oregon found that 770 trees per acre could be planted on an 8 by 8 foot spacing in slash of 65 tons/acre (Fir Report 1986). Similar work done on the Hayfork Ranger District of the Shasta Trinity National Forest supports the findings (Glines and Bryant 1986). To consider the no-burn alternative, the risk of wildfire through the rotation must be reduced and seedling establishment must be assured.

Three alternatives were considered.

Alternative 1 involves broadcast burning with protection of streamside management zones (SMZ).

The two other alternatives both involve the no-burn choice and yarding of unmerchantable material (YUM).

Alternative 2 requires YUM of material 15 inches in diameter or larger.

Alternative 3 requires YUM of material 8 inches and larger.

### Rationale:

For the purpose of developing this example, the following 1986 cost data was taken from the Forest Plan, file data, and projected experience on the Shasta Trinity National Forest:

an average broadcast burning cost of \$350 per acre;

burning costs increase by \$450 per acre to protect SMZ;

for YUM (15-inch material) with no-burn: \$305 per acre. No broadcast burn costs incurred:

for YUM (8-inch material) with no-burn: \$700 per acre. No broadcast burn costs incurred; and

after broadcast burning, hoedad planting at \$100 per acre.

The \$120 and \$130 planting costs for the two YUM alternatives were estimated using the (previously mentioned) average cost of \$100 per acre for broadcast burned units, and a \$228 per acres figure from an Oregon Bureau of Land Management planting contract, where planting took place in a unit with 65 tons of slash per acre.

In unburned units, fire hazard is greater for the first 10 years. How long this increased hazard persists depends on the vegetation that develops on the site. The amount of time can vary from 5 to 15 years for various brush species. If grass invades the site, the time can be as little as 2 or 3 years.

After 10 years, young trees and brush create a high fire hazard, regardless of earlier treatment. Brush and grass act as a fuel ladder to carry ground fire up into the crowns of young trees.

After 40 years, the fire hazard begins to decrease. As the tree canopy closes, it shades out brush and grass. In addition, the bark of conifer trees starts to become fire resistant, especially in Douglas-fir and Ponderosa pine. Also, fire hazard is a function of the amount of large fuels on the site. YUMing reduces large fuels and reduces fire hazard compared to sites where the material is left.

Average seedling survival is estimated to be greater than 90 percent in both burned and unburned units.

Economics (Least Cost Analysis): cost savings are in todays dollars, therefore discounting does not enter the analysis. Since both no-burn alternatives result in less fire hazard over the rotation and equal tree survival (compared with the baseline alternative), the measure of economic efficiency is the least-cost alternative (table 6).

Table 6. Comparing costs for three alternatives of slash treatment.

Activity	Broadcast Burn and Protect SMZ	YUM 15"+ no-burn	YUM 8"+ no-burn
		Dollars per acre	
Broadcast burn, including slash hand lines and mop up.	350		
SMZ protection	450		
YUM, fell hardwood, lop and scatter		305	700
Planting cost Totals	100 900	130 435	120 820

In addition to reduced cost, other nonpriced benefits can be attributed to the no-burn alternative. YUM will:

- 1. make more fuel wood available;
- 2. protect highly erodible soils form direct rainfall and runoff impacts;
- 3. assure that site preparation, planting, and survival objectives will be met;
- 4. meet air quality standards;
- 5. meet water quality standards;
- 6. allow planting during the first season after harvest;
- 7. minimize sprouting of fire-dependent species;
- 8. allow more flexibility in selecting the shape of the harvest unit (as fire behavior considerations will not have to dictate unit shape);
- 9. increase assurance of saving snags for wildlife; and 10. distribute the workload throughout the year, reducing the fluctuation in personnel needs.

## Conclusions:

Yarding of unmerchantable material is a more cost-effective way to assure protection of streamside management zones. It protects soil

productivity and prevents soil erosion and sedimentation, while reducing fire hazards and allowing rapid establishment of seedlings on clearcuts. Broadcast burning is more costly, and imposes greater risks for streamside management zones during burning operations.

Soil scientists and hydrologists provide a way to mitigate the impacts on the soil and water resource, saving money in the process.

### References:

Fir Report, winter 1986. Planting seedlings in slash. Oregon State University Extension Service, Medford Oregon.

Glines John and Jeff Bryant, 1986. Situation statement of fuel management on the Hayfork Ranger District, Shasta Trinity National Forests. Presented at a management team meeting, summer 1986.

Example 6: <u>Title</u>: <u>Erosion Control/Restoration Project</u>, <u>Plumas National Forest</u>, California.

Source: Based on Poco Creek Restoration Project, Beckwourth Ranger District, Plumas National Forest (1987). Bob Schultz, Hydrologist.

## Problem:

During the preliminary site examination of a proposed 1987 timber sale, a 3,400 acre watershed within the sale area was found to contain severe, active gully erosion caused by past overgrazing and numerous deep cow paths. The stream below has a very unstable channel. To large headcuts (eight and eleven feet in height) have advanced upstream nearly 1,200 feet, leaving a gully 15 feet deep and 40 to 80 feet wide.

Off-site impacts include reservoir sedimentation, and water quality and fish habitat degradation. Additional on-site degradation is expected as the headcuts progress into and destroy a 20-acre wet meadow.

# Soil and Water Involvement:

The timber sale plan called for harvest of 310 acres in this watershed. The forest hydrologist analyzed the situation and judged that increased peak flows resulting from harvest would significantly accelerate headcut advancement and lateral cutting, resulting in unacceptable degradation of on- and off-site values. An interdisciplinary team and the District Ranger concurred with this assessment.

# Approaches to Solution:

Harvesting the scheduled timber sale without some adjustment was excluded as a viable choice. Two viable alternatives were considered:

- 1) Eliminate all grazing and other damaging activity from the watershed, and postpone harvesting the three million board feet for 20 years. These actions would give the area time to adequately heal and stabilize.
- 2) Construct a series of rock check dams in the existing gully raising the channel bottom to maintain a maximum 4 percent gradient between check dams. All fill material would be of sand-gravel filter quality. To stabilize the cow paths and the gully, fence cattle out of the area containing the deep cow paths, and also out of the area around the check dams.

### Rationale:

The first alternative, eliminating grazing and postponing the harvest cut, would have four easily quantifiable costs:

- a) the cost of postponing the harvest of 3.014 million board feet (\$1,293,000 at a weighted stumpage value of \$429/MBF) for 20 years;
- b) the cost of dredging a downstream reservoir of the continuing (though declining) sedimentation (\$30,000 in the year 1990 and \$190,400 in the year 2015);
- c) the cost of relocating a short segment of road (in 1992) that will be threatened by the gully erosion (\$2,500); and
- d) the cost of reconstructing an existing check dam in 1995 that will be destroyed by the gully erosion (\$20,000).

This alternative will cause other associated value losses related to grazing and fisheries. However, grazing losses will be minimal compared to the costs already quantified, and quantifiable fishery costs are not currently available.

The second alternative, constructing erosion control check dams, will cost an estimated \$110,000, including project planning and design, plus the following yearly maintenance costs:

1st year \$5,000 2nd year 2,000 3rd - 20th year 1,000

This alternative will solve the erosion problem within a year of it's completion, including any accelerated erosion caused on the watershed by the planned harvest. Under this alternative, postponing the harvest is not necessary.

#### Economics:

The costs of harvest postponement (alternative 1):

Value of harvest if cut today (1987): \$1,293,000

Value of harvest if postponed

(discounted) 20 years (at 4 percent): \$590,000

Difference in present value (value loss), \$1,293,000 - \$590,000: \$703,000

Costs of dredging reservoir in 1990 and 2015
(discounted to the present at 4 percent): \$ 90,500

Cost of road relocation in 1992

(discounted to the present at 4 percent) \$ 2,050

Cost of reconstructing check dam in 1995
(discounted to the present at 4 percent): \$ 14,600 \$810,150

This \$810,150 is the potential benefit from the second alternative, which solves the erosion problem and allows an unpostponed harvest cut.

Costs of erosion control (alternative 2):

Project planning, design and construction:

\$110,000

Present value of annual maintenance (discounted at 4 percent)

18,350 \$128,350

## Conclusions:

The present cost of constructing a series of rock check dams and maintaining them for 20 years (alternative 2) is \$128,350. Opting for this alternative saves the costs of waiting 20 years for nature to heal the problem as outlined under alternative 1. The present value of these savings: \$810,150.

The present net value (PNV) of alternative 2 over alternative 1 is \$681,800.

The benefit-cost ratio (B/C) of alternative 2 is 6.31 to 1.0.

Assuming that all cost figures are true and correct, and that no major costs have been overlooked, there is no doubt that constructing the rock check dams is economically a better choice than postponing the harvest cut.

Example 7: Title: Prevention and/or Restoration of Soil Compaction

<u>Source</u>: Research paper: John Helms' study of soil compaction and stand growth on the Foresthill Ranger District, Tahoe National Forest, California. March, 1983.

### Problem:

Tractor yarding of Ponderosa pine in northern California causes significant soil compaction of skid trails. Trees growing on or near skid trails suffer reduced height and diameter growth over the next rotation, thus reducing future harvest volume and value. Are there economical harvest systems or mitigation measures available for reducing soil compaction and maintain timber growth and yields?

## Soil and Water Involvement:

A soil scientist can generate alternatives for preventing or reducing soil compaction and negative effects on tree growth. Aerial extent of the compacted ground and soil bulk density measurements can be provided by a soil scientist. Using Froehlich's (1984) curve, height growth loss can be estimated from the percentage increase in bulk density over natural conditions.

## Approaches to Solution:

Two alternatives are evaluated for reducing or eliminating soil compaction and timber volume/value loss. Alternative 1 is to replace tractor yarding with cable yarding. Though cable yarding is more expensive than tractor yarding, the reduction in volume/value loss over the next rotation may offset the resulting decreased stumpage value due to higher yarding costs.

Alternative 2 is to use tractor yarding followed by rehabilitation of the skid trails and other compacted areas using a winged subsoiler ripper.

### Rationale:

Average logging area compacted:

tractor yarding: a goal of 20 percent compacted ground is a reasonable maximum for tractor logging.

cable yarding: area compacted by cable logging was set at 2 percent based on a logging engineer's estimate of width, length, and distance between cable ways.

tractor/ripping: Andrus and Froehlich (1983), found up to 90 percent of compaction can be alleviated by making one pass with a winged subsoiler. (90 percent of the 20 percent compacted ground leaves 2 percent of the ground still compacted.

Degree of compaction: Helms (1986) found uncompacted soil had a bulk density of .83, and compacted soil had a bulk density of 1.25. Because no equipment is on the ground, cable yarding causes less compaction, thus bulk density was estimated at 1.12 for cable logging.

Height growth loss: Froehlich and McNabb (1984) developed a relationship for estimating height growth loss form percent increase in soil compaction. For example, a 51 percent increase in soil density translates to a 35 percent decrease in height growth.

Weighted height growth loss: Because the productivity loss is associated only with the compacted ground, the weighted loss is calculated by multiplying the percent area compacted by the percent height growth loss.

Resulting site index: Site index is reduced to reflect the loss in productivity attributed to compaction. For example, a site with an index of 100 that has lost 7 percent in height growth results in a site index of 93. Growth and yield tables are use to estimate wood volume losses.

Volume at 50 years (cu.ft./ac.): From yield tables, Oliver and Powers (1978). Because yield tables are organized for even increments, interpolation of the yield between site index 80 and 100 is necessary (i.e., a site index of 80 at 50 years (12 x 12 ft. spacing) yields 7,472 ft. A site index of 100 yields 10,766 ft.3.

10,766 - 7,472 = 3,294 ft. 3. 3294/20 = 165 ft. 3 per site index point.

Therefore, in the tractor example, for site index 93:  $10,766 - [(165)(7)] = 9,611 \text{ ft.}^3$ .

Cubic foot wood value - logging cost:

In the draft Forest Plan for the Shasta Trinity National Forest, Ponderosa pine was valued at \$1.53 per cubic foot.

A logging engineer converted costs for both cable and tractor methods were converted from costs per thousand board feet to costs per cubic foot of wood.

The wood value for each logging system is computed by subtracting the logging cost from the wood value. (The value of \$.25 per cubic foot for tractor yarding is based on a logging cost of \$50/thousand board feet. The value of \$.43 per cubic foot for cable yarding was based on \$85/thousand board feet costs.)

Value at 50 years: this is simply the cubic wood value times the volume at 50 years.

Resulting benefit (\$/ac.): This is a comparison of values for different alternatives. In this example, both cable yarding and

tractor yarding with mitigation are compared with tractor yarding alone. These values are the "future value" used in the economic analysis.

Mitigation cost: Cable logging mitigation is reflected in the increased logging costs.

Ripping skid trails cost \$26.40 per acre based on Andrus and Froehlich (1983). This is based on costs of \$132.00 per acre of skid trail, with 20 percent of the ground compacted, i.e.,  $$132 \times 20\% = $26.40$ .

<u>Economics</u>: Timber resource outputs and economics of each logging system are compared in table 7.

Table 7. Comparison of logging systems on growth and yields and economic

Denotites.	Tractor yarding	Cable yarding	Tractor + ripping
Percent area compacted:	20%	2%	2%
Degree of compaction (BD)		.831.12 (35% increase)	
Height growth loss (Froehlich's curve)	35%	24%	35%
Weighted height growth loss	.20(35)= 7%	.20(24)= .5%	.20(35) =.7%
Resulting site index	93.0	99.5	99.3
Volume at 50 years (ft. 3/ac.) (Oliver and Powers)	9,611	10,684	10,651
Yarding cost per cubic ft.	\$.25	\$.43	\$.25
Wood value - logging costs (per cubic foot)	\$1.53 - \$.25 =\$1.28	\$1.53 - \$.43 = \$1.10	\$1.53 - \$.25 = \$1.28
Value at 50 years (Cu. ft. value x volume)	\$12,302	\$11,752	\$13,634
Resulting benefit per acre		<b>\$-</b> 550	\$1,332
Mitigation cost per acre		\$2,191	\$26.40
Internal rate of return Present net value (at 4%) Benefit/cost ratio (at 4%) * A negative value.		* \$-2,268 -28.3:1	8.16 % \$161.03 7.1:1

## Conclusions:

The cable yarding alternative is not an economically viable option due to high yarding costs and the small increment of increased timber yield at the end of the rotation. The skid trail rehabilitation alternative is a viable option, with an internal rate of return of 8.16 percent above inflation.

Discounted at any real rate below 8.16 percent, this alternative will yield a positive present net Value and a benefit/cost ratio greater then 1.0. Assuming an inflation rate of 3 percent, this alternative will pass both the Water Resources Council's 7-3/8 percent return rate and the Office of Management and Budget's 10 percent return rate.

### References:

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Example 8: Title: Impact of Site Preparation On Timber Growth and Yields

<u>Source</u>: George E. Dissmeyer and Bennett Foster, Soil Water and Air, and Cooperative Forestry, Southern Region, Atlanta, Georgia

### Problem:

The way a site is prepared for tree planting can significantly affect soil productivity and timber growth and yields. Site preparation practices that compact the soil, remove forest litter, and remove nutrients adversely impact soil productivity.

## Soil and Water Involvement:

Soil scientists review site preparation prescriptions and recommended treatments to conserve soil productivity. Soil scientists have trained foresters employed by the Forest Service, the states, and industry in the basics of soil and water conservation. They demonstrated that this pays dividends in increased timber growth and yields. As a result, there is a growing trend in using site preparation practices that conserve soil productivity.

## Solution:

A large proportion of site preparation in the South is done using shearing and windrowing or bulldozing and windrowing. Research on the impacts of these practices on timber growth and yields showed that they reduced site index by as much as  $1^{l_1}$  feet, compared to soil conserving practices. Soil and water specialists utilized training, project reviews, and other methods to get this message to foresters. Many foresters had the same concerns, and were quick to employ better site preparation practices.

#### Rationale:

Dissmeyer (1985) summarized the principles of soil productivity and the impacts of site preparation on soil productivity and timber yields.

Research on the impacts of site preparation on soil productivity has demonstrated that site index can be reduced by as much as 14 feet by treatments that remove topsoil, remove litter and compact the soil. For the purposes of this example, shearing and windrowing was compared with chopping and burning.

The growth difference between treatments was assigned a conservative 5 feet. Patterson (1984) used the 5 foot difference in his analysis of growth and yield differences for loblolly pine. Patterson data is reported in this example.

Economics: Patterson used a site index of 70 feet for chopping and burning (table 8), and 65 feet for shearing and windrowing (table 9). He used a growth and yield model to predict the differences in productivity for a 36-year

rotation with 600 trees per acre. Stumpage prices used were \$10 per cord of pulpwood and \$100 per 1,000 board feet of sawtimber. A 4 percent discount rate was used.

Table 8. Alternative 1. Site preparation with chopping and light burn.

Year	Description \$	Amount/Acre	Wood Volume/Acre
1984	Site prep & planting cost	\$120	
1999	Thinning income	102	10.2 Cords
2010	Thinning income	213	5.3 Cords &
			1,600 Bd. Ft.
2020	Final harvest income	979	2.5 Cords &
			9,541 Bd. Ft.

Internal rate of return: 8.1 percent. Present net value (at 4 percent): \$252.

Benefit/cost ratio (at 4 percent): 3.1 to 1.0.

Table 9. Alternative 2. Site preparation with shearing and windrowing.

Year Description \$ Amount/Acre Wood Volume/Acre

rear	Description	5 Amount/Acre	wood volume/Acre
1984	Site prep & planting	cost \$170	
1999	Thinning income	73	7.3 Cords
2010	Thinning income	134	9.6 Cords &
			377 Bd. Ft.
2020	Final harvest	838	3.5 Cords &
			8.029 Bd. Ft.

Internal rate of return: 5.8 percent.

Present net value per acre (at 4 percent): \$123. Benefit/cost ratio (at 4 percent): 1.72 to 1.00.

## Conclusions:

Investing \$50 per acre more in preparing the site with shearing and windrowing reduced the present net value by \$129 per acre, compared to chopping and burning.

Shearing and windrowing reduced the rate of return from tree growth by 2.3 real percentage points, and reduced the Benefit/Cost Ratio from 3.10 to 1.00 to 1.72 to 1.00. The 5 foot decrease in site quality resulted in less sawtimber and more pulpwood per acre.

Conversely, maintaining site quality by employing chopping and burning yielded larger trees and more valuable products.

### References

Dissmeyer, G. E. 1985. Economic impacts of erosion control in forests. In: Proceedings Southern Forestry Symp. Nat. Assoc. of Prof. Forestry Schools and Colleges. November 19-21, 1985, Atlanta, Ga. (In Press).

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Example 9: Title: Forest Fertilization

<u>Source</u>: Ken Luckow, Modoc National Forest, Timber Stand Nutrient Status Inventory, March, 1986.

### Problem:

Soil and foliar analysis revealed that most true fir and many Ponderosa pine stands on the Modoc National Forest in northeastern California are deficient in nitrogen. Also, many of these stands are deficient in sulfur. Because of these nutrient deficiencies, stands grow more slowly, reducing future harvest volume and value.

## Soil and Water Involvement:

Using preliminary guidelines developed for fertilizing California forests (Miles and Powers 1983); the soil scientist and silviculturists on the Modoc National Forest prioritized and sampled over 50 timber stands for soil and foliar nutrient content.

These stands represented many of the Benchmark timber/soil types on the Modoc National Forest. Mineralizable soil nitrogen was used to predict the percent response to fertilization. Nitrogen and six macro-nutrients were analyzed in the foliage samples to help verify the soil nitrogen test, and to determine possible secondary nutrient deficiencies.

Using the soil resource inventory, stand record cards, and other on-site timber information and abiotic factors, the soil scientists and silviculturists determined basal area, average DBH, age of stand, timber site class, and cubic feet of standing wood volume.

## Approaches to Solution:

Determining if forest fertilization is economically viable: for the purposes of this example, candidate timber stands had to be within 20 years of a commercial thinning, or 40 years of final harvest.

The sooner a harvest follows the effective period of fertilization, the greater the economic return. Timber stands selected were primarily pole- to young saw timber size, precommercially thinned Ponderosa pine or white fir. Growth response induced by fertilization was estimated using nutrient status information and Meyer and Schumacher site index and volume tables.

### Rationale:

Break-even analysis was used to evaluate the economics of investments in forest fertilization using a 4 percent real interest rate (Fight). In this example, the break-even point is a break-even year--where the number of years the stand could grow for the fertilization investment to be equal to, or break-even with, the 4 percent discount rate.

If the stand were harvested before that time the investment would pay more than 4 percent. If the stand were harvested after that time, the investment would pay less than 4 percent.

In the Modoc National Forest Plan the stumpage value for a cubic foot of white fir is \$.75, and \$1.27 for a cubic foot of Ponderosa pine.

Foliar macro-nutrient analysis indicated that sulfur was a commonly deficient nutrient on the Modoc National Forest. Thus, all forest fertilization projects would include a combination of nitrogen plus sulfur fertilizer. The cost was \$75 per acre.

Economics: From table 10, all four stands will result in favorable fertilization investments. The highest priority stand with the most favorable investment return is stand #24 followed by #29, #41, and #8.

Stand #24 ranks highest because it generates the greatest increase in value (\$617) and can be harvested in five years, since it is larger than the minimum required DBH for harvesting. In addition, the rate of return for stand #24 will not drop below the 4 percent rate for 53 years, indicating that its rate of return is rather large.

Stand #29 ranks second in priority because it can also be held for 53 years before its rate of return will drop below 4 percent. However, it generates slightly less increase in value (\$610). There is a 10 year wait until it reaches a minimum standard DBH for harvesting.

Stand #8 is given the lowest priority, even though it generates a greater increase in value (\$300) than stand #41 (\$236). The reason is that it will be 20 years before the stand reaches the minimum DBH for harvesting, compared to 10 years for stand #41.

Table 10. Economic comparison of 4 candidate timber stands for fertilization.

Α.	Species	Stand #24 P. Pine*	Stand #41 P.Pine	Stand #8 W. Fir	Stand #29 ** W. Fir
В.	Site index (MeyersP. Pine; SchumacherW.Fir)	90	80	40	50
C.	Basal Area (ft. <sup>2</sup> )	120	115	110	200
D.	Average DBH (inches)	15	10	8	11
E.	Stems per acre	100	210	315	300
F.	Average Age (Years)	70	80	80	70
G.	Current Stand Volume (ft <sup>3</sup> )	2,800	2,241	1,733	4,500
н.	Projected Unfertilized Stand Volume Next Decade (ft <sup>3</sup> ) (Meyers 1938)	4,188	3,480	2,964	6,534
I.	10 Year Volume Increment (ft <sup>3</sup> )	1,388	1,239	1,231	2,034
J.	Predicted 5 year Volume response to Fertilization ( pe (Miles & Powers 1983)	rcent) 35	15	33	40
К.	5-year volume response Due to Fertilization (ft <sup>3</sup> )	486	186	400	814
L.	Wood Value Per ft <sup>3</sup>	\$1.27	\$1.27	\$.75	\$.75
М.	Added Value from Fertilization	\$617	\$236	\$300	\$610
N.	Fertilization cost/acre	\$75	\$75	\$75	\$75
o. 53.	Economic break-even Year (at 4 percent real interest ra 5	ite) 5	53.5	29	35
P.	Years to Reach Merchantable Si if Fertilized	ze <u>0</u> 52.4%	10	20	10
Pre Ben	ernal rate of return: sent net value (at 4 percent): efit/cost ration (at 4 percent) ority:	\$432.13	12.2% \$84.43 2.13 3	7.2% \$61.92 1.83 4	23.3% \$337.09 5.49 2
	. Pine is Pondersa pine.				

<sup>\*</sup> P. Pine is Pondersa pine. \*\* W. Fir is white fir.

### Conclusions:

These conclusions have been reached to a significant degree using intuitive reasoning. However, their validity can be shown using the following quantitative methodology:

Priority 1: Stand #24 generates its \$617 value after five years, yielding and IRR of 52.4 percent, a PNV (4 percent) of \$432.13, and a B/C Ratio (4 percent) of 6.76 to 1.00.

Priority 2: Stand #29 generates its \$610 value after ten years yielding an IRR of 23.3 percent, a PNV (4 percent) of \$337.09, and a B/C Ratio (4 percent) of 5.49 to 1.00.

Priority 3: Stand # 41 generates its \$236 value after ten years, yielding an IRR of 12.2 percent, a PNV (4 percent) of 84.43, and a B/C Ratio (4 percent) of 2.13 to 1.00.

Priority 4: Stand #8 generates its \$300 value after 20 years, yielding an IRR of 7.18 percent, a PNV (4 percent) of \$61.92, and a B/C Ratio (4 percent) of 1.83 to 1.00.

An additional economic benefit, which has not been discussed here, is the shortening of the rotation period for growing trees to a target size. It has been calculated that the use of fertilization one or more times can shorten the rotation period by one or more decades. This would have a very favorable economic effect, considering all costs, from plantation establishment to final harvest.

#### References:

- Fight, R.D., "Economics of Forest Fertilization in the Pacific Northwest" Presented at the California Conference on Forest Tree Nutrition and Soil fertility. May 19-20, 1980, Redding, Ca. 5pg, unpublished.
- Luckow, K.R., "Modoc National Forest Timber Stand Nutrient Status Inventory", March, 1986, USDA Forest Service, Modoc National Forest, 19 pg, unpublished.
- Meyer, H.M., "Yield of Even-Aged Stands of Ponderosa Pine", Oct. 1938, USDA Forest Service, Pacific Northwest Forest Experiment Station, Technical Bulletin No. 630.
- Miles, S.R. and Powers, R.F., "Fertilizing California Forests with Nitrogen - Preliminary Guidelines," November, 1983, USDA Forest Service, Pacific Southwest Region, 14 p., unpublished.
- Schumacher, F.M., "Yield, Stand, and Volume Tables for White Fir in the California Pine Region", Oct. 1926, University of California College of Agriculture, Agricultural Experiment Station, Berkeley, California, Bulletin 407.

Example 10: Title: Bedding and Phosphorus Fertilizing Loblolly Pine Plantations

Source: Drawn largely from Gent, J.A., Jr., H.L. Allen, R.G. Campbell, and C.G. Wells. 1984. Magnitude, duration; and economic analysis of loblolly pine growth and response following bedding and phosphorus fertilization. NCSFFC Report No. 17. School of Forest Resources, N.C. State University, Raleigh. 28p.

### Problem:

Many forest soils of the lower coastal plain of the Southeast U.S. are poorly drained and extremely deficient in phosphorus. The poorest soils have site indices around 55 (50-year base). On 25-year rotations, these sites yield about 18 cords per acre. At stumpage prices of \$15 per cord and regeneration costs of \$100 per acre, these sites barely yield a minimum acceptable return of 4 percent.

## Soil and Water Involvement:

Soil scientists suggest modifying the site physically to improve soil aeration by bedding and to modify the site chemically with phosphorus fertilizer. Bedding is the continuous piling of soil into mounds 3 to 4 foot wide and 4 to 8 inches high. Seedlings planted on top of these mounds are raised above ground water level, and natural soil fertility is concentrated in the area where they are planted.

Research has demonstrated that this combination of treatments on these lower coastal plain soils significantly improves timber growth and yields.

## Approaches

to Solution: Bed and fertilize to prepare soil for tree planting.

### Rationale:

Research has documented height growth responses ranging from 8 to 15 feet greater than on untreated sites. Height growth increase responses translate directly into increases in site index.

Bedding one year before planting adds about \$40 per acre to the site preparation cost. Phosphorus fertilization (300 lbs./acre) adds about \$25 per acre to the cost of planting.

Stumpage values in the Southeast U.S. range from \$10 to \$25 per cord, depending on the market. A conservative average value of \$15/cord is assumed for purposes of this example.

The following table contains the loblolly pine volume yields from various site indexes, based on an average of various yield tables in current use in the area.

				Tot. vol. per	
S.I.	per acre	acre from 10	Vol.	acre from 15	Vol.
(year 50)	untreated	ft. ht. increase	increase	ft. ht. increase	increase
	(cords)	(cords)	(cords)	(cords)	(cords)
55	18	33	15	39	21
60	23	36	13	41	18
65	30	41	11	45	15

Economics: The table below displays increased future values per acre of pine when a site that has been bedded and fertilized.

Site index changes of 10 and 15 units (feet) are shown. Bedding costs are \$40/acre. Fertilization at the time of planting costs \$25/acre. Current value of stumpage is \$15/cord.

Inflation assumed to affect all values. Therefore, changes reflected are only those over and above inflation.

Bedding cost (\$40) is incurred in year 0; fertilization cost (\$25) is incurred in year 1; and value increases in year 26. The alternative rate of return (discount rate) is 4 percent.

10	10 Foot Increase in Site Index					15 Foot	Increase i	in Site I	ndex
	Value incr.	Econ.	return	on	Vol	. incr.	Econ.	return o	n
	due to a						\$65 cc		
	10 ft. incr.	at 4	percent	disc. ra	ate	15 f	t. incr.	at 4 pe	rcent
disc.	rate								
<u>S.I.</u>	in S.I	IRR	PNV	B/C	_ i	n S.I.	IRR	PNV	B/C
55	\$225	4.96%	\$17.12	1.27	;	\$315	6.35%	\$49.58	1.77
60	195	4.38%	6.30	1.10		270	5.71%	33.35	1.52
65	165	3.70%	-4.52	0.93		225	4.96%	17.12	1.27

### Conclusions:

Apparently, lower site soils respond better to bedding and phosphorus fertilization. If land with a site index of 65 or above responds with only a 10-foot height increase, the treatment does not pay.

Bedding and fertilizing sites with site indices of 55 to 65 are justified if this action results in 15-foot height growth increases. The treatment is not justified if only a 5-foot height growth increase results.

### References:

- Allen, H.L. and R. Ballard. 1982. Fertilization of loblolly pine. pp. 163-81. Symposium on the Loblolly Pine Ecosystem (East Region). North Carolina State Univ., Raleigh, NC 335 p.
- Gent, J.A., Jr., H.J. Allen, R.G. Campbell, and C.G. Wells. 1984. Magnitude, duration, and economic analysis of loblolly pine growth response following bedding and phosphorus fertilization. NCSFFC Report No. 17. School of Forest Resources, N.C. State Univ., Raleigh, NC 28 p.
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- Pritchett, W.L. and N.B. Comerford. 1982. Long-term response to fertilizer on selected southeastern Coastal Plain soils. Soil Sci. Soc. Amer. J. 46:640-644.

Example 11: Title: Timber Species Selection for Sandhill Region of Florida

<u>Source</u>: The example is based on "Options for Management of Sandhill Forest Land," a paper by R. H. Brendemuehl. The paper compares height growth and survival of several timber species grown on deep sand soils.

Kenneth W. Outcalt, Southeastern Forest Experiment Station, Olustee, Florida, supplied unpublished height growth and volume equations for sand pine.

David Belcher, Southern Region, Atlanta, Georgia, projected timber growth and yield data using the Southern Region Growth and Yield System (yet to be published).

Olen E. Aycock, Southern Region, Atlanta provided cost and product value data used in the analysis.

Species recommendations are based upon soil interpretations presented in the "Guide to Classification and Management of Southeastern Coastal Plain Forest Soils", prepared by the Cooperative Research in Forest Fertilization (CRIFF) organization at the University of Florida (Comerford and Mollitor 1982).

### Problem:

Deep, droughty sand soils occupy a significant area of the Sandhill Region of the southern Coastal Plain. Planting the wrong species of trees (slash or loblolly pine) on these soils has resulted in wasted investments in site preparation and planting costs, because plantations of these species quit growing and die before they produce commercially valuable products.

Soils data and interpretations were not used in selecting the appropriate species for deep sands. These sands are over six feet deep and have very low nutrient reserves. Sand and longleaf pine are the recommended species for deep sands.

## Soil and Water Involvement:

Soil scientists classify and map soils, and make species suitability recommendations for each soil based upon guidelines such as Comerford and Mollitor (1982). Soil scientists provide training in identifying these deep sands in the field, and in using soil/species suitability guidelines.

## Approaches to Solution:

Soil scientists can continue to map soil, make species suitability recommendations and provide training. On National Forests, they can participate in and review timber prescriptions for soil/species suitability.

#### Rationale:

Comerford and Mollitor's (1982) guide recommends planting sand or longleaf pine on deep sands. Slash pine is not recommended, but has been planted here and produced no return to the landowner. After 15 years, slash pine growth rate is retarded. The landowners recognized they made a mistake in establishing slash pine.

In this example, the 15-year old slash pine is destroyed, and sand pine is planted and grown to a 35-year pulpwood rotation. Because the slash/sand pine scenario covers 50 years, it can not be directly compared to 70 year scenarios for sand pine and longleaf pine.

 $\underline{\text{Economics}}$ : Two pulpwood rotations for sand pine were compared to one sawlog rotation for longleaf pine (table 11). The pulpwood rotations were 35 years and the sawlog rotation was 70 years.

Both species are recommended for these soils. Both were established (at 500 trees per acre) using site preparation.

Sand pine is established after scarification and spot seeding, at a cost of \$50 per acre. Longleaf pine requires intensive site preparation to reduce competition and to facilitate machine planting. To establish longleaf pine, shearing, windrowing, and disking are performed, followed by machine planting. The cost for establishing longleaf pine is \$220 per acre. The cost for soil scientist input for the project is \$5 per acre.

Sand pine is grown for 35 years, then harvested without any thinnings. Revenue from each harvest is \$1,619 per acre, with sale administration costs of \$15 per acre.

Longleaf pine receives two thinnings: one precommercial thinning at age 25 at a cost of \$50 per acre; and a commercial thinning (with a stumpage value of \$593 per acre and administrative costs of \$18 per acre) at age 40.

The stumpage value of longleaf pine at final harvest is \$2,476 per acre, with an administrative cost of \$15 per acre. Sawtimber stumpage was valued at \$125 per thousand board feet, and pulpwood stumpage at \$35 per cunit (CCF).

Brendemuehl's (1981) data was used to project height growth differences between species and tree mortality. Brendemuehl reports that sand pine was 50 feet tall at 25 years and longleaf was 34 feet. These height/age data points were entered into the Southern Region Growth and Yield System to estimate growth and yields for the two species.

On first impression, it would appear more economical to grow sand pine on pulpwood rotations than to manage for longleaf. National Forests, however, manage timber for more than just wood fiber. Forests are also directed to manage for other benefits, including wildlife, aesthetics, and recreation.

Managing longleaf pine over the length of a sawlog rotation provides these resource opportunities, while sand pine grown for pulpwood will not.

For a complete comparison of the benefits of managing each species on National Forests, the cost of management and the value of rare and endangered species, wildlife, aesthetics, and recreation of each situation would need to be

considered. However, for private and industry ownerships, the strictly economic comparison might be valid. Here, sand pine would provide greater economic returns to the landowner.

Table 11. Economic analysis of growing sand and longleaf pine in deep sands.

	sand pi	ne	longleaf pine			
Year	Description	Cost	Income	Description	Cost	Income
		\$/Ac	\$/Ac		\$/Ac	\$/Ac
0	Soils input Site prep. & seed	5 50		Soils input Site prep. & plant	5 220	
25				Precommercial thin.	50	
35	Sale administration Clearcut (4,625 cu. ft.) Site prep. & seed	15 50	1,619			
40				Commercial thinning (1,694 cu. ft.) Sale administration	18	593
70	Sale administration Clearcut (4,625 cu. ft.)	15	1,619	Sale administration Clearcut (19,391 bd.ft.) (& 148 cu.ft.)	15	2,476
Prese	rnal rate of return: 1 ent net value (at 4%): Fit/cost ratio (@ 4%):	\$442	0 1.0	Internal rate of ret Present net value (a Benefit/cost ratio (	at 4%):	\$34

### Planting Slash Pine Off-site on Deep Sands

Planting the wrong species on these deep sands and later discovering the mistake gives a different economic result. It is improper to make a direct comparison between this analysis and the above analyses, because the time frames are different and can lead to misinterpretation.

Many private and industrial landowners planted slash pine on deep sands, only to discover after 15 years that they have made a serious mistake--the plantations have stopped growing and are disintegrating.

Many owners chose to destroy the slash pine and replant with sand pine (table 12). Costs associated with this decision include carrying the original investment in the unproductive plantations for 15 years. Also, no income is received when the plantation is destroyed. Initial site preparation to establish slash pine often employs double chopping, fire and planting, which costs approximately \$175 per acre.

Table 12. Economic analysis of off-site planting of slash pine followed by sand pine

Year	Description	Cost	Income
		\$/Ac	\$/Ac
0	Site prep. & planting (Slash pine)	175	
15	Site prep. & planting (Destroy first plantation and establish sand pine)	100	0
50	Sale administration Clearcut (4,625 cu. ft.)	15	1,619

Internal rate of return: 3.95 percent Present net value (at 4%) -\$4.82

Benefit/cost ratio (at 4%): 0.98 to 1.0

When the first plantation is destroyed, the site is prepared for the sand pine plantation. The example assumes that first stand is chopped, burned, and replanted at a cost of \$100 per acre.

Sand pine is managed on a 35 year pulpwood rotation when it is clearcut, yielding \$1,619 per acre in revenue with an administrative cost of \$15 per acre. No thinnings are made during the rotation.

By catching the mistake at age 15 and reinvesting in sand pine, the landowner essentially breaks even on his investments. If he had not changed to sand pine, he would have invested in slash pine and received very little or no return on the investment.

## Conclusions:

Soil interpretations for tree species suitability can be analyzed for economic returns. The species selected for a given site can result in significant differences in income to the landowner.

### References:

Brendemuehl, R. H. 1981. Options for management of sandhill forest land. South. J. Appl. For. Vol. 5, No. 3, pg. 216-222.

Comerford, N. B. and A. V. Mollitor. 1982. Guide to classification and management of southeastern coastal plain forest soils. Cooperative Research in Forest Fertilization, Univ. of Fla., Soil Sci. Dept., Gainesville, Fla., 85pg.

Example 12: Title: Range Management, Sedimentation and Fisheries.

<u>Source</u>: Stanley Basin Analysis, Sawtooth National Forest, Sawtooth National Recreation Area, 1986.

### Problem:

The application of watershed measures to reduce sedimentation of streams that are used by fish for spawning has a cost. Often the cost is the only issue discussed for these activities with little attention to the values that result. Though the costs of applying these practices can be computed, the resulting values are often difficult to determine.

Best management practices for activities such as grazing, road building and timber harvesting have been developed through experience and research. Models have been developed which can be used to compare the relative difference in sediment production and impacts on fish for various alternatives (figure 1).

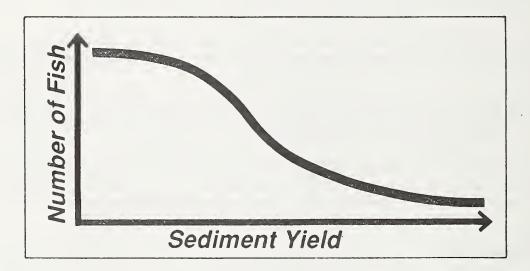


Figure 1 a conceptual model demonstrating the effects of sediment on fish populations.

# Soil and Water Involvement:

Increasing concerns about and demands for anadromous fisheries has required Forests to develop or consider direction in their Forest plans that would coordinate fisheries with other resource management.

In this example, to reduce sedimentation and induce anadromous fisheries outputs, the Sawtooth National Forest developed riparian standards and guidelines for a grazing allotment. Field data relating estimates of sediment on the streambeds to the density of chinook salmon and steelhead was collected for stream segments in grazed and ungrazed areas.

## Approaches to the Problem:

The Forest conducted an economic analysis showing estimates of increased fisheries output associated with implementing riparian standards and guidelines. These riparian standards and guidelines include soil and water, fisheries, wildlife, and recreation values.

Implementation of the riparian standards and guidelines on the allotment required either a reduction in the number of Animal Unit Months (AUM's) on the allotment or several miles of fencing. This reduction would improve the riparian areas and reduce sedimentation of the streams resulting from surface runoff and mechanical breakdown of stream banks.

Mathematical models exist for evaluating various alternatives and sediment mitigation practices. These models can estimate relative differences in amount of sediment produced by the activities, and the resulting effects on fish populations.

The following formula can be used to determine the reduction in sediment as a result of the application of watershed protection measures. In most cases, some type of best management practice would be applied to management activities. Thus, the increase in benefits attributed to watershed protection should be related to those measures which exceed the minimum applied practices.

A variety of studies have been done to determine the value of fish. While studies have been done for sport fisheries, studies for commercial fisheries have the strongest supporting information. This is particularly true for the anadromous salmon fishery.

The following information on the value of salmon was developed by the American Fisheries Society (see Special Publication No. 13, 1982). Values for most freshwater game, nongame, and commercial species are included in this publication.

### Rationale:

Supporting information:

- 1) field data was collected from both grazed and ungrazed stream reaches;
- 2) sediment sources: overland transport and mechanical breakdown of stream banks;
- 3) alternatives ranged from fencing to reductions and/or removal of livestock;
- 4) induced anadromous fisheries outputs were calculated using field data for both chinook salmon and steelhead; and
- 5) cost savings included the reduced need for structural range and watershed improvements.

Economics: Using a discount rate of 4 percent over the 20-year project period, implementation of this alternative reduced AUM value by \$789,900 (a cost).

The resulting benefit to fisheries was \$1,806,100, based on an increase of 61,453 juvenile chinook salmon and 2,866 steelhead produced after sedimentation reductions occurred. Further benefits were obtained through reduced investments and operational costs of \$1,891,300.

The benefit/cost ratio for this selected alternative is 17:1.

## Conclusions:

Implementation of forest plan standards and guidelines that protect water quality can result in significant economic benefits from the fishery resource. It is significant in this example that the economic return from the increased fishery output exceeded the benefits derived from grazing.

Considering the costs necessary to mitigate the effects of grazing, it would be difficult to justify not reducing the AUM's because of the resulting impacts and costs. In areas where impacts to the watershed occur due to grazing activities, thorough resource and economic analyses that consider the benefits and costs of the alternatives are needed.

Example 13: <u>Title</u>: Rangeland Renovation - Reduced Erosion and Increased Forage

<u>Source</u>: Rangeland Renovation, McKenzie, Grand River, and Ashland Ranger Districts, Custer National Forest, 1984.

### Problem:

Runoff from some types of badland and prairie soils carries a large volume of sediment. In the past, small stock watering ponds served as catch basins for this sediment. This was a short term solution, however, because many of the ponds filled with sediment, were eventually overtopped, and washed out.

Areas of poor range condition and minimal ground cover produce excessive sediment. Many of soils in this example have a thin but very dense claypan and a salty surface horizon. This greatly reduces infiltration of precipitation and soil moisture available for plant growth. Thus, vegetation growth is reduced to near zero and vegetative cover is spotty.

Any solution to this problem needs to increase infiltration, available soil moisture, and vegetative cover, while reducing runoff and sediment yields.

## Soil and Water Involvement:

Some areas can benefit substantially from conversion from weed species to native prairie grasses. Other areas have soil limitations which reduce or preclude growth of vegetation. These soils occur on the "thin, claypan range site" as described in northern plains terminology. For sites like these, a soil scientist can map soils, make soil interpretations to evaluate the suitability of various rehabilitation treatments, and recommend suitable vegetative cover species.

# Approaches to Solution:

Breaking up the claypan layer and reducing salt concentrations in the surface creates soil conditions favorable for plant growth. Claypan prevents percolation of salts down through the soil profile, and concentrates salts at the soil surface.

Note that Agriculture Research Service (ARS) research found that salts are leached downward after the claypan is ripped, and that private landowners adjacent to these areas have succeeded in raising crops after ripping or plowing these thin claypan soils.

### Rationale:

The claypan soils have a thin silty surface horizon (approximately 4 inches thick) with excessive salt concentration. Salts remain near the surface because the thin, impermeable clay layer immediately below prevents them from leaching through the soil profile.

Ripping, furrowing, or otherwise mixing the two layers (approximately 8 to 12 inches deep) increases infiltration rates, percolation rates, and rooting depth. Past projects increased forage production by an average of 1,200 pounds per acre, and as high as 1,600 pounds per acre. The desirable (palatable) portion of the vegetation can be increased along with range condition rating.

Agriculture Research Service data indicates sustained benefit from fertilizing after furrowing. On a thin claypan soil near Ekalaka, Montana, nitrogen fertilizer increased forage growth 310 percent compared to the same fertilizer used on a nonfurrowed site. The benefit of a single application on the furrowed site was still very evident when the study ended eight years later.

Table 13. Costs and benefits of rangeland rehabilitation project.

Pro	ject costs	project	benefits

#### Treatments

-126 acres with diversions

- 12 acres ripped

- 15 gullies treated

total costs:

\$2,020

020	
Forage Response	
after treatment	1,600 lbs/acre
before treatment	- 400 lbs/acre
Increased forage	1,200 lbs/acre
Animal Unit Months	(AUM's)
before treatment	
after treatment	
Sediment	
before treatment	0.2 tons/acre
after treatment	
reduced sediment	0.1 tons/acre
Reservoir life	
after treatment	80 years
before treatment	-40 years
increased life	40 years
Wildlife forage	
after treatment	800 lbs/acre
before treatment	-200 lbs/acre
increased forage	600 lbs/acre

Internal rate of return: 5.9 percent.

Present net value (at 4 percent): \$2,146.

Benefit/cost ratio (at 4 percent): 2.06 to 1.00.

Economics: Since the early 1980's, several Custer National Forest Ranger Districts have done rangeland ripping along with some diversion ditching to reduce runoff flows and improve forage production. In 1984, the McKenzie Ranger District installed a combination of diversion ditches and rangeland ripping in an attempt to reduce runoff flows into a gullied area of a pasture. Table 13 displays the results of this effort.

Construction of small reservoirs will average \$20,000. Increased vegetative cover and improved infiltrations rates will reduce sediment yields and prolong the life of these reservoirs by 40 years. The average life of the reservoirs was 40 years before treatment, thus \$20,000 is saved forty years in the future. It is estimated that treatment will be required every 40 years to maintain benefits.

## Conclusions:

The added benefit is that heavier forage cover and good infiltration will reduce runoff and the resulting sediment, while providing added cover and forage for wildlife.

The life expectancy of small reservoirs for livestock water is doubled from 40 years to 80 years. Doubling the life expectancy of these small reservoirs--which cost \$20,000 to construct--thus reduces by half the total cost for the entire 80 year period. The treatment also improves the storage life of large reservoirs along the Missouri River.

Example 14: <u>Title</u>: Chaparral Conversion In Arizona--Water Yield Response and Effects on Other Resources.

<u>Source</u>: USDA-Forest Service, Rocky Mountain Forest and Range Experiment Station, Research Papers 126 and 127, Brown, Thomas C., Alden R. Hibbert, et.al. 1974, updated to 1987 values (through the CPI) with reference to related land use information and forest planning by Edward R. Frandsen, 1987.

### Problem:

As the population of Central Arizona increases, demand for water, outdoor recreation, hunting opportunities, and other woodland products and services also increase. Efforts to meet these demands raise the question: "What product mix should National Forest lands in the Salt Verde Basin" emphasize; is this management emphasis socially and economically acceptable, and is the management decision in 1974 compatible with current forest planning?"

# Soil and Water Involvement:

To identify areas favorable for treatment (chaparral conversion to grass for reduction of fire hazard, and increases in water yield and forage for livestock grazing, hydrologic surveys were conducted by Forest Service hydrologists, soil scientists, and others. These surveys included in-depth inventories of vegetation and soils, and were combined with topographic, recreation, and other National Forest information.

Forest Service watershed specialists delineated 139 separate chaparral areas; estimated costs of brush conversion; and determined the effects of conversion on yields of water, forage, and sediment. Effects on fire fire hazard, recreation use, aesthetics and visual resources, and wildlife habitat and hunting impacts were also determined.

### Solution:

Chaparral control methods that have proven effective for Arizona are:

- 1) root plowing;
- 2) prescribed burning;
- 3) herbicides, and
- 4) chemical treatment (herbicides) in combination with the other three treatment methods.

Due to steep slopes (more than 20 percent) and often rocky and gullied land, only 2 to 8 percent of the chaparral area delineated was suitable for mechanical methods of control (Hibbert et al. 1974.) Establishing grass by sowing seeds directly into the ashes after burning (as opposed to establishing grass on areas of dead brush) also was considered.

### Rationale: Decision and support rationale:

Inventory revealed 139 chaparral areas, totaling 332,796 acres, would meet crown cover, slope, and management criteria for conversion.

Water runoff: increases in runoff from chaparral brush converted lands were estimated from streams leaving the watershed; water supply to downstream hydroelectric dams; agricultural, municipal and industrial water use at final points in the Phoenix Valley; and increased water sources for wildlife and livestock.

Forage increases: forage increases for livestock and wildlife were created.

Where allotments were not overstocked, forage increases for livestock grazing were converted to pounds of beef, through increases in allotment carrying capacity. The value of increases in grazing capacity (with and without brush conversion) was estimated through expected net returns from cattle sales.

Fire cost savings: Conversion from brush-to-grass generally made it less costly to control fires.

Following brush conversion, a 20 percent reduction in fire starts was observed.

Fire benefits (in 1972 dollars) ranged from 3 cents to \$2 per acre. Fire cost savings from the original analysis were updated to 1987 values using the Consumer Price Index (CPI). Updated fire cost savings (benefits) range from 8 cents to \$5.44 per acre.

Recreation: Increases in hunting opportunities through improved vehicle access were determined for 3 of the 129 areas converted. These three areas were close to Phoenix, and helped meet some of the demand for outdoor recreation from this dense population center.

The following wildlife habitat improvements occurred:

the movement of animals improved; the abundance and quality of browse was augmented; and the variety of food increased.

## Economics:

Benefit/cost analysis of chaparral brush conversion was performed on National Forest lands in the Salt-Verde Basin of Arizona. The costs of converting chaparral brush areas to grass and maintaining the conversion over a 50-year period was compared with the benefits to society.

Economic efficiency (positive benefits to costs) was not the only decision criterion, but it was a major factor in deciding whether to invest in the brush conversion project.

Undiscounted total costs (1972 dollars) were \$6.5 million dollars. Updated to 1987 values, through the Consumer Price Index (CPI), estimated costs of conversion would be \$17.7 million dollars.

Benefit/Cost analysis shows that alternative 1 (a treatment using an initial burn followed by maintenance burns and use of herbicide sprays) is economically feasible on 96 of the 139 areas.

This represents 82 percent (273,383 acres) of the total acres delineated; and 83 percent (147,118 acres) of the actual conversion acres.

Alternative 2 involves an initial herbicide treatment (soil-applied) treatment followed by maintenance burns. Table 14 shows total costs of conversion (benefits and costs.) For alternative 2, 72 of the 139 areas were economically feasible.

Table 14. Total benefits of conversion of all areas with benefit/ cost ratio greater than 1.0:1, Salt-Verde Basin, Arizona Alt. 1 Alt. 1 (best (low estimate)3 estimate) Average Present Value (PV) Benefits Water Increase in off-site Runoff (acre-feet) 30,443 24,010 27,281 268,907 Value to agric. (\$) 340,960 305,551 43,494 36,721 Value to power (\$) 41,766 Total water value (\$) 384,454 305,628 347,317 Forage Increase in grazing capacity (in Animal Unit Months (AUM)) 5,883 25,608 35,520 Value (\$) 265,710 26,146 189,076 Fire 90,289 35,082 76,775 Value (\$) Annual benefits (\$) 661,182 346,503 552,660

202,238

144,265

352,660

199,687

291,835

369,347

(\$)

Annual costs

Annual PNV Benefits

 $<sup>^{1}</sup>$ Changes due to conversion, measured by the "with" minus the "without" technique.

<sup>&</sup>lt;sup>2</sup>Constant 1972 dollars over 50-year planning horizon discounted at 6-7/8 percent. Analysis performed in 1972 using Water Resource Council prescribed discount rate of 6-7/8 percent.

<sup>&</sup>lt;sup>3</sup>Alternative 1 reduced by using low estimates of yields of water runoff, forage production and utilization, and fire benefits.

<sup>4</sup> Eighty percent of the estimated on-site runoff increase.

 $^{5}$ Annual benefits and costs are equal to PV [i(1+i)t / ((1+i)t - 1)].

Annual economic benefits, updated to 1987 values through the CPI, for each of the alternatives were:

alternative 1 (best estimate) \$1,798,415; (low estimate) \$942,488; and alternative 2, \$1,503,235.

Annual costs, updated to 1987, were:

alternative 1 (best estimate) \$793,791, (low estimate) \$550,087; and alternative 2, \$959,235.

Net annual benefits, by alternative, were:

alternative 1 (best estimate) \$1,004,623, (low estimate) \$392,400; and alternative 2. \$543.148.

Annual average costs and benefits per acre of converted chaparral brushland area also were updated to 1987 values. Updated average costs per acre by alternative are:

alternative 1 (best estimate), \$5.39, and (low estimate) \$5.30; and alternative 2 average cost per acre converted was \$9.00.

Net returns per acre converted, by alternative, are: alternative 1 (best estimate) \$6.83, (low estimate) \$3.78; and alternative 2, \$5.09.

## Conclusions:

Although water yield improvement practices are probably limited to less than one percent of the forest and rangeland area, there is a significant future in forest and rangeland management for these activities. Where economically feasible and environmentally acceptable, the production of extra water may well be one of the most appropriate objectives of land management (Hibbert 1983).

On areas favorable for treatment, converting brush to grass reduces fire hazard, and substantially increases water yield and forage for livestock and wildlife. Where treatment areas are kept small, properly designed and interspersed with brush areas, the edge effect created by the openings will enhance the wildlife habitat.

Had the chaparral conversion not been done, the economic benefits foregone would represent the opportunity costs.

Determining the feasibility of converting chaparral brush areas requires integrated interdisciplinary input, and sound hydrologic, soils, and vegetation data. This information was provided by Forest Service earth scientists, range scientists, and wildlife biologists.

## References:

- Hibbert, Alden R, Edwin A. Davis and David G. Scholl, Chaparral Conversion Potential In Arizona, Part I: Water Yield Response and Effects, USDA-Forest Service, Research Paper RM-126, July 1974.
- Brown, Thomas C; Paul F. O'Connell and Alden R. Hibbert, Chaparral Conversion Potential in Arizona, Part II: An Economic Analysis, USDA-Forest Service, Research Paper RM-127, August 1974.

Example 15: Title: Bernalillo Watershed Flood Project

<u>Source</u>: Pilot Watershed Project Report, Soil Conservation Service/Forest Service, Albuquerque, New Mexico, 1958. Cibola National Forest, Region 3.

## Problem:

The town of Bernalillo, New Mexico developed into an urban community with surrounding farming areas. No provisions were made for the passage of flood runoff into the Rio Grande. Runoff from summer floods periodically (once every 1 to 3 years) overtopped bridges, covered highways, flooded streets, damaged residences, and clogged irrigation works with sediment.

# Soil and Water Involvement:

Soil and watershed scientists from the Soil Conservation Service (SCS) and Forest Service evaluated and implemented watershed practices that proved effective in eliminating flood damages suffered by the community.

# Approaches to Solution:

The Soil Conservation Service proposed a flood water retarding structure. The Forest Service proposed watershed terraces on flat land and steep (up to 60 percent) slopes; contour furrows (pitting and chiseling); revegetation of woody pinyon-juniper and grasses; rock gully structures; and fencing to control grazing.

## Rationale:

Costs were actual costs incurred for the project.

Benefits of flood damage reduction were based on past flood damages. The benefits were derived from reduced flooding and sedimentation and were estimated using the following process (see SCS Handbook, 1964):

Step 1: a flood discharge versus frequency graph was constructed.

Step 2: a discharge versus damage graph was constructed.

Step 3: a discharge versus damage graph was constructed, using results from Steps 1 and 2.

Step 4: the graph in Step 3 was graphically integrated to arrive at an annualized benefit value.

Other pertinent information:

All costs were incurred evenly over the first 5 years of the project. Effectiveness of watershed measures is based on past performance of similar practices used in the southwest and intermountain Regions.

Range depletion and deterioration produced the flood water and sediment problems of the developed irrigated valley. Range conditions were predominately poor, with only a few areas of fair and good condition.

The flood retarding structure is designed to regulate the maximum flow expected from a storm which might occur not more than once in 100 years on the average. The structure can operate for 50 years unimpaired before sediment accumulation encroaches on detention capacity.

Since virtually none of the flood waters flow into the Rio Grande, sediment from the watershed contributes only slightly to sedimentation of downstream reservoirs.

Annual conservation benefit is estimated at \$3,460. Of this, \$2,050 is the value of increased forage production, and \$1,410 is the value of increased crop production.

Table 15. Distribution of costs and benefits by measures and groups of measures, Sandia Mountain Tributaries, Bernalillo Watershed (1987 dollars).

Sandia Mountain Tributaries, Bernalillo Watershed (1987 dollars).						
			Aver	age Annual	Benefit	
	Total	Average	Flood water	Conser-	Total	
	cost	annual	& sediment	vation	annual	
	spread	costs	benefit	benefit	benefits	
	evenly over					
	first 5 years.	(at 4%).				
(Dollars)	(Dollars)	(Dollars)	(Dollars)	(Dollars)		
Flood water retardation structure			ų			
(Piedra Lisa Wash)	333,480	13,820	21,590		21,590	
Stabilization and sed ment control measures		605	945	315	1,280	
Stabilization of critical areas	178,800	7,410	9,930	2,285	12,215	
Contour furrowing- range seeding	160,910	6,670	6,895	11,030	17,930	
All measures	687,770	28,505	39,360	13,630	53,015	

Estimated life of project: 50 years. Costs occur beginning of each year, benefits occur end of each year.

Internal rate of return = 8.95 percent

Present net value (at 4 percent) = \$502,017

Benefit/cost ratio (at 4 percent) = 1.79 to 1.00

Economics: Table 15 shows the costs and benefits derived from the watershed measures. Benefits to wildlife, range, or other resources not directly attributable to the objectives of this project were not valued. The costs and benefits are in 1987 dollars. These values are amortized over a 50 year period at a 4 percent discount rate.

## Conclusions:

Installation of flood retarding measures can be cost effective as shown in this example. Simple measures such as stabilization and seeding of upland watersheds are as cost effective as more traditional measures such as flood water dams and retention basins.

# References:

USDA Soil Conservation Service, 1964. Economic Guide for Watershed Protection and Flood Prevention. Chapter 3. Washington, D.C.

USDA, 1958. Sandia Mountains Tributaries of the Rio Grande Watershed. Albuquerque, New Mexico.

Example 16: <u>Title</u>: Recouping Timber Growth and Yield Losses Through Skid Trail Rehabilitation.

<u>Source</u>: George E. Dissmeyer and Bennett Foster, Soil Water and Air and Cooperative Forestry, Southern Region, Atlanta, Georgia

# Problem:

Timber yields from trees growing in primary skid trails and skid roads is severely reduced. Soils within skid trails are severely compacted limiting soil moisture availability and root development. Soil nutrients are removed during skidding and in the construction of skid roads.

# Soil and Water Involvement:

Soil and water specialists prescribe rehabilitation treatments for skid trails and skid roads.

# Solution:

Install rehabilitation treatments. Rehabilitation treatments usually include soil ripping or tillage, waterbarring, seeding, fertilizing, and mulching where needed.

# Rationale:

Wert and Thomas (1981) found volume growth of 42-year old Douglas-fir (Psuedosuga menziesii) in primary skid trails was reduced by 74 percent, compared to trees growing in undisturbed soil. Hatchell (1970) found loblolly pine (Pinus taeda) seedling establishment and early growth in primary skid trails were adversely affected by compaction. He suggested disking or subsoiling to break up the compaction and improve seedling establishment and early growth.

Hatchell (1981) reports tilling and fertilizing heavily compacted skid trails and landings resulted in seedling growth (through age four) as being close to growth occurring on undisturbed soils. Based upon verbal communication, 12-year height growth for trees growing in the skid trails is essentially as for those growing in undisturbed soil.

Dissmeyer (1985) presents the following basic concept for soil productivity:

"Growth differences observed during the first 5 to 10 years of stand development on upland sites will persist through a pulpwood rotation and likely to a sawlog rotation. Thus, if loblolly growth with rehabilitated skid trails is essentially the same as those growing on undisturbed soil, then heights at the end of a sawlog rotation should be approximately the same."

Economics: The economics of primary skid trail and landing rehabilitation can be approximated using the data by Wert and Thomas (1981). Benefits from skid trail rehabilitation for hardwood, hardwood/pine, and shortleaf pine on site index 60 and 70 (base 50 years) land is estimated (table 16).

Evaluated sawlog rotations of 60 to 70 years were used. Table 16 shows the expected volume of timber per hectare and the value per cubic meter.

A growth loss of 74 percent (Wert and Thomas 1981) was used to predict growth of timber on skid trails. Empirical field observations suggest similar growth losses in Southern forests. The predictions showed 26 percent of timber volume on skid trails, compared to undisturbed soil. Growth losses on skid trails ranged between 233 and 311 cubic meters per hectare (3,184 to 4,440 cubic feet per acre) for the rotation.

Hatchell (1981) stated that long term growth could not be projected from his 4-year study on the effects of compaction, but the data summarized by Dissmeyer (1985) and Amateis and Burkhart (1985) on early (5-10 years) showed that height differences between site preparation treatments on upland Coastal Plain and Piedmont sites persist to the end of pulpwood rotations.

The growth curves presented by Dissmeyer (1985) and Amateis and Burkhart (1985) suggest that growth differences would probably also persist through 60-to 70-year sawlog rotations.

Table 16. Analysis of economic benefits of skid trail rehabilitation in the

management of three southern timber types.

		Ti	mber type	
			Hardwood	Shortleaf
	Units	Hardwood	pine	pine
Rotation	Years	70	60	60
Harvest volume per hectare		-	350	420
Value per cubic meter			\$42.86	
Total value of timber per hectare		Q=0191	<b>V</b> .= <b>V</b> 00	<b>40.12</b> )
for uncompacted soil	1986 \$	\$8,600	\$15,000	\$27,000
Timber volume per hectare on skid				
trails (26% of uncompacted soil)	Cubic M	78	91	109
Timber volume lost per hectare	Cubic M	223	259	311
Cost per hectare of skid trail				
rehabilitation	1986 \$	\$900	\$900	\$900
Timber volume recovered (75% of loss)				233
Value of timber volume recovered	1986 \$	\$4,771	\$8,315	\$14,980
Internal rate of return	percent	2.4	3.8	4.8
Present net value (at 4 percent) 198	_		_	\$524
Benefit/cost ratio (at 4 percent)			0.88:1	
Average cost per hectare of skid tra			ripping or	

Average cost per hectare of skid trail for waterbarring, ripping or disking, seeding, fertilizing, and mulching where needed.

Hatchell (1981) found that 4-year heights were the same between rehabilitated skid trails and uncompacted soil. Twelve year heights were essentially the same (McKee, verbal communication). Projecting to the end of a pulpwood rotation, the trees in the former skid trails should be about the same as trees growing on the uncompacted soil. Tree height should also be approximately the same at the end of a sawlog rotation.

For the purposes of this example, is was estimated that only 75 percent of the growth loss would be regained by skid trail rehabilitation.

The average cost to fully treat a hectare of skid trail is \$900 (\$354 per acre).

Full treatment includes waterbarring, ripping or disking, seeding, fertilizing and mulching where needed. Using a 4 percent discount rate, the present net values of rehabilitating three timber types range from minus \$594 to \$524 per hectare (-\$234 to \$206 per acre).

The benefit/cost ratio for hardwood is 0.34; for hardwood pine 0.88; and for shortleaf pine 1.58. The rates of return range from 2.4 to 4.8 percent.

## Conclusions:

Investments in skid trail rehabilitation in moderately high-value shortleaf pine contributes significantly to timber production and a financial sound investment.

In relatively low-value hardwood and hardwood/pine timber types, skid trail rehabilitation will not produce a positive financial return (using a 4 percent discount rate). Using a lower discount rate (2 percent) would yield a positive economic return. Skid trail rehabilitation will be even more productive in more highly-valued timber types.

## References

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#### APPLICATIONS

This project, from the beginning, was designed to present a series of examples demonstrating approaches that can and have been used for similar projects. Each contains information and demonstrate procedures that can be applied to similar situations.

Because the material is presented in this way, and because it contains an extensive bibliography, it provides a number of opportunities for practical application. For instance: using one or more of the procedures illustrated by this report, the economic costs and benefits of timber sale alternatives can be evaluated. The analysis may determine that the application of mitigation measures for watershed may in fact restore soil productivity and in turn result in sustained or increased growth for timber.

The examples come from all areas of the United States, and represent a good cross-section of resources and approaches. Many are based on work done by agencies, research, universities, and private landowners.

This effort brought together a large amount of economic information related to resource management and mitigation measures. This project may well serve as a prototype for developing resource management economics and for identifying research needs. As it proceeded, an amazing array of information was obtained. While not all of the information led to examples, it did provide a basis to determine future needs in research and studies.

This report will be useful in federal and state agency, industrial, university and private applications. The following lists some specific uses (or users) of the information and approaches presented:

Resource Planning Act assessments: forest land management planning; environmental impact statements; state forest resource planning; industrial forest land planning; addressing national issues; training: universities: small landowners; Soil Conservation Service activities; Economic Research Service: international conservation activities: analysis of resource interactions; establishing budget priorities; communications with other resource specialists; and monitoring activities.

#### RESEARCH NEEDS

In constructing the examples of soil and water economics and in reviewing accumulated literature, it became clear that several types of data and resource interaction relationships are not currently available. Without these data and relationships it is not possible to quantitatively estimate induced outputs and benefits for these situations, though they are qualitatively recognizable.

Economic analysis or justification of resource management effort can proceed where the specific physical input/output interactions are known and quantified.

The following are a few specific research needs if more complete economic analyses or valuations are to be made:

- 1. development of fish/sediment relationship models for warm and cold water fisheries for all sections of the country;
- 2. research on "instream flow needs"--the relationship of stream flow regime to fisheries, wildlife, benthic organisms, recreation experience and values, aesthetics, and sustaining riparian resources;
- 3. research on riparian/wetland dependent resources and their dependence on soil and water resource management;
- 4. expansion of soil productivity research, including timber, range, and wildlife management interactions with soil properties and soil productivity for all sections of the country;
- 5. research on soil and watershed management associated with road construction and maintenance, and the cost/effectiveness of soil and water management associated with roads; and
- 6. research on the value of improved water yield and quality to downstream users of water.

#### CONCLUSTONS

Watershed management involves the basic resources of soil and water, upon which the production of all forest and range land products and services depend. The production of goods and services from these lands is a function of the manner in which the soil and water resources are managed, conserved, and used.

Watershed management is the process of formulating and carrying out courses of actions involving the manipulation of natural, vegetation, and human resources on a topographically delineated watershed. Watershed management considers social, economic, and institutional factors; changes in land use and vegetative cover; and nonstructural and structural actions taken to achieve watershed management objectives.

The interrelationships between soil and water and other related land resources are embedded in watershed management. Watershed management practices or projects illustrated by report examples, include:

- 1) rehabilitation practices aimed at correcting past land use actions;
- 2) protection practices to maintain, sustain, augment, or enhance current or future land uses; and
- 3) integration of watershed practices aimed at sustaining or enhancing upland productivity (while preventing adverse on-site or downstream impacts) into other resource development actions.

This report provides a workable framework discussing a set of economically feasible watershed practices/projects which have been applied on National Forest lands. Most of the examples presented demonstrate positive returns from investments in soil and water resource management.

A few examples evaluated practices that were not cost effective for a specific site and management situation. However, these practices applied in another setting may prove to be cost effective.

These examples may assist others in quantifying and evaluating the economics of water and related land resource practices and projects. Such analyses will aid in prioritizing projects or practices for funding to gain the greatest economic efficiency.

In the examples, incremental outputs and values of induced goods and services attributable to investments in management of soil and water resources on forest and range lands are identified. The examples provide insights into the economic implications and impacts of watershed management and other related land resource activities, practices, and projects.

#### APPENDIX A

## MATRICES USED IN LITERATURE SEARCH AND AS FRAMEWORKS FOR ECONOMIC ANALYSES

Five matrices were developed to estimate the economic benefits from soil and water resource management in the five emphasis areas (tables A-1 through A-5). These matrices served three functions:

- 1) directed the literature search;
- 2) governed the cataloguing of papers; and
- 3) projected the induced outputs and economic benefits from soil and water resource management.

The matrices were developed under the premise that it was very unlikely that the literature or file reports from agencies would have examples of economic analyses which quantified induced outputs from soil and water resource management. However, the literature does contain numerous papers that demonstrate the effect of different soil and water practices (for example on seedling height growth, or on pole and sawtimber growth).

The literature has height growth curves, growth and yield tables, growth and yield models, and other procedures that can be linked together to project timber yields at the end of the rotation. The same linkages can be developed for forage, fisheries, and water enhancement. (The road emphasis area, however, required a different approach.)

By linking several procedures together, we produced matrices to estimate outputs of timber, forage, fisheries, and enhanced water from specific soil and water practices. The matrices provide a framework for comparing differences in resource outputs between very poor, poor, good, and excellent soil and water resource management.

The difference in resource outputs between lower and better quality soil and water practice is claimed as an induced output for proper soil and water resource management. For the purposes of this project, soil and water resource management can claim the induced output as a benefit from its program only if investments were made in soil and water management as a part of the project.

Once the induced output from soil and water investments is estimated, an economic analysis is performed. The cost of providing soil and water input into the project is determined and compared with the value of the induced output. A benefit/cost ratio, a present net value, and an internal rate of return are computed for the soil and water practice.

The matrices focused the literature search and governed cataloguing of literature when it was received. The cells in the matrices identified the type of information, data, and relationships needed. The literature search sought out specific papers containing information identified for each cell. Once papers were found, they were identified with the cell(s) for which they contained information.

This literature search did not locate and catalogue all available papers for the five emphasis areas. The matrices are still useful for identifying missing

information, or information that would apply to a new situation within the five emphasis areas.

For developing economic examples, induced output was limited to the one primarily associated with the matrix used. For example only timber outputs were estimated in developing the examples with the timber matrix. Obviously, the soil and water related practices listed in the timber matrix affect water yields, water quality, fisheries, and enhanced water. These practices are listed in other matrices, and are evaluated there.

However, matrices can be linked together to evaluate an array of resource interactions, thus giving a more complete analysis of impacts, induced outputs and combined economic benefits within the five emphasis areas. Similar matrices can be developed for several of the other resource areas and linked with these for a more comprehensive analysis.

## Timber matrix

The timber matrix requires specific data and relationships to estimate the induced timber output from soil and water management (table A-1). The literature search was limited to major types being managed in the various regions of the country: Douglas-fir, jack pine, loblolly pine, lodgepole pine, longleaf pine, maple, oaks, ponderosa pine, red pine, sand pine and slash pine.

A partial list of soil and water related timber management practices are displayed in column 1. These management practices reflect different soil and water treatments or impacts: soil tillage, soil compaction, soil exposure, nutrient management, and mitigation. For purpose of developing economic examples, soil and water related practices of logging systems, site preparation, fertilization, skid trail rehabilitation, and reforestation were chosen.

Stocking levels are influenced by soil and water practices (column 2). stocking levels from natural regeneration are often governed by the amount of soil exposure, tillage or scarification, soil compaction, and nutrient availability. Data on stocking levels as a result of different types of site preparation can be found in the literature, or better yet, in in-house stocking survey reports.

As the stand matures, mortality reduces the number of stems per acre. Given initial stocking levels for each soil and water related practice, future stocking levels can be estimated using mortality curves or survival over timber curves. It is then possible to determine the practices providing adequately stocked stands throughout the rotation (under normal conditions), and those practices that will not. Stocking differences between treatments can be estimated over time.

Soil and nutrient management affect seedling and sapling growth (column 3). The literature has numerous papers documenting the influence of these soil and water related practices on early growth. Papers reporting height growth differences at 5 to 10 years of age are preferred over reports for ages less than 5 years.

If literature is not available for the effects of different site preparation practices on seedling/sapling growth, this information can be gathered through field observations.

The procedure for collecting this data starts with locating plantations of similar age (in the 5- to 10-year age range) that have been established using a wide variety of site preparation treatments. All must be located on the same soil series.

Selected plantations should all be on sites receiving the same amount of precipitation; with the same aspect; and at the same elevation. This eliminates growth variations from differences in soil and site location. To be selected, plantations must be planted with the same nursery stock to eliminate growth differences due to varying genetic characteristics.

Table A-1. Timber	matrix	(specie	s-specif	ic)						
(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8	)	
Soil & Water	Stock.	S&S	P&S	Ht.	G&Y	Induced	I	Econ	omics	3
Related	level	Gr.	Gr.	Gr.	Tables	Output	(a)	(b)	(c)	(d)
Practices	(%)	(Ft)	(Ft)	Curve	Cu.Ft.	Cu.Ft.	В	С	B/C	IRR
Logging system										
Tractor	%	Ht.	Ht.	R	Ya					
Cable	%	Ht.	Ht.	R	Yb	Yb - Ya	\$	\$	B/C	%
High lead	%	Ht.	Ht.	R	Yc	Yc - Ya	\$	\$	B/C	%
Site preparation	.,									
Shear & windrow	%	Ht.	Ht.	R	Yd					
Disking	%	Ht.	Ht.	R	Ye	Ye - Yd	\$	\$	B/C	%
Chop & burn	%	Ht.	Ht.	R	Υf	Yf - Yd	\$	\$	B/C	%
Herbicide	%	Ht.	Ht.	R	Υg	Yg _ Yd	\$	\$	B/C	%
Fertilization				DII D	7.73					
Unfertilized			Ht. or D		Yh	*** ***	•	•	D / C	0/
Fertilized		Ht.	Ht. or D	BH R	Yi `	Yi - Yh	\$	\$	B/C	%
Skid trails										
No rehab.	%	Ht.	Ht.	R	Yj					
With rehab.	%	Ht.	Ht.	R	Yk	Yk - Yj	\$	\$	B/C	%
with renab.	/0	110.	110.	n	1 K	ık – ıj	Ψ	Ψ	Б/С	/0
Species Selection										
Species "1"	%	Ht.	Ht.	R	Y1					
Species "m"	%	Ht.	Ht.	R	Ym	Ym - Y1	\$	\$	B/C	%

The next step is to measure and average tree heights for the different site prepared areas. Differences in average height between plantations can be attributed to differences in site preparation treatments.

Height growth curves and models are available to project height of saplings through to the end of the rotation (column 5). Early height growth differences between treatments can be translated into estimated height or site index differences at the end of the rotation.

Occasionally, height growth responses from site preparation have been tracked through 23 to 25 years or to pole size stands, and reported in the literature (column 4). These long term studies confirm growth curves and models (column 5). Again, height differences in pole stands can be projected to the end of the rotation using the growth curves and models (column 5).

Fertilization is used when a stand is established or after stand closure, depending upon the nutrient(s) applied and the purpose of the treatment.

On phosphorus-deficient soils, phosphorus applied when the trees are planted enhances growth from the seedling stage through the end of the rotation. is enhanced. Nitrogen is frequently applied after stand closure to enhance pole and sawtimber growth (column 4).

Once height growth differences are projected to the end of the rotation, growth and yield tables or models can be used to determine yields resulting from various soil and water treatments (column 6).

The timber yield differences between low quality and better soil and water practices are determined. This is the increment of induced output due to improved soil and water management (column 7).

For site preparation, if treatment "D" produced the highest yield (YD), the induced output over treatment "E" is "YD" minus "YE" (column 7).

In some cases, both timber and watershed make investments into a project that results in enhanced timber growth. Sometimes it is not possible to estimate what proportion of the induced output is attributable to which investment.

An example is fertilization. Soil scientists make soil interpretations stating that a soil needs to be fertilized, and recommend the rate of fertilizer application. Timber pays for the fertilizer and for the application. Both watershed and timber made significant investments in the project, and each have claim to a portion of the benefits. It is not possible to divide the benefits between the two, thus a joint benefit/cost analysis is made.

The increment of induced timber output has monetary value depending upon the species and products. The value or benefit is expressed as present value in dollars per acre (column 8a). The costs associated with soil and water management are converted to present cost per acre of the project (column 8b). A benefit/cost ratio is computed (column 8c). Finally, an internal rate of return on the investment is calculated (column 8d).

# Forage Matrix

The forage matrix links information, data, and relationships together to estimate the induced outputs (browse and forage) and economic benefits. The resource being managed is forage which can be consumed by a variety of wildlife and domestic livestock. Economic benefits from induced forage yields from soil and water management can be estimated by translating these yields into carrying capacity.

The literature search sought specific types of information, data, and relationships for each cell in the model (table A-2). Column 1 lists several soil and water related practices that affect forage production or utilization. Literature reporting forage yields for these practices is reported in column 2.

Information on the conversion of pounds of forage to carrying capacity for various animals is in column 3. The value of each type of animal is also needed for the matrix.

The forage model estimates benefits from soil and water management in the following fashion:

For range rehabilitation of a specific vegetation type, potential treatments are identified (column 1).

In searching for literature and developing examples for this effort, only range rehabilitation, water development, and grazing system practices were considered. The literature and forest reports used contain information on the pounds of forage associated with the different types of range rehabilitation practices and grazing systems (column 2).

Forage production associated with untreated conditions is compared with that produced by a rehabilitation practice. The difference between the treated and untreated forage yields is the increment induced by the treatment (column 3).

Table A-2. Range matrix	(by rai	nge type)						
(1)	(2)	(3)	(4)	(5)		(6	5)	
Soil and water	Forage	Induced	Conver.	Increment		Ecor	nomic	5
related	yield	resource	factor	of	(a)	(b)	(c)	(d)
practice		output	to AUMs	AUMs	В	C	B/C	IRR
	(lb.)	(1b.)						
Range Rehab.								
Untreated	Ya							
Erosion control	Yb	Yb - Ya	R	#	\$	\$	B/C	%
Brush control	Yc	Yc - Ya	R	#	\$	\$	B/C	%
Gully control	Yd	Yd _ Ya	R	#	\$	\$	B/C	%
Type conversion	Ye	Ye - Ya	R	#	\$	\$	B/C	%
Grass seeding	Yf	Yf - Ya	R	#	\$	\$	B/C	%
Water Development								
W/o water development	Yg							
With water development	_	Yh - Yg	R	#	\$	\$	B/C	%
Grazing System								
System "i"	Yi							
System "j"	Yj	Yj - Yi	R	#	\$	\$	B/C	%

The increment of induced forage yield needs to be converted into numbers of animals. Conversion factors to translate pounds of induced forage yield into numbers of animals are recorded in column 4.

Forage is consumed by a variety of animals. Thus the model can be used to evaluate soil and water treatments on both domestic and wild animals. The increment of forage is translated into carrying capacity, measured in animal unit months (AUM's) of forage (column 5).

Different animals have different economic value. The value per AUM is multiplied by the increment of AUM's to derive the economic benefit (column 6a).

The cost of providing the soil and water input into the project is recorded in column 6b.

A benefit/cost ratio is computed (column 6c). The internal rate of return is shown in column 6d.

A word about conversion factors: they vary widely. They can vary between vegetative types and localities. Even within a type and location, different scientists have different opinions as to the proper conversion factor. Get a consensus for a representative conversion factor, or use an average of the factors available.

Water developments requires a different approach. Water distribution is a key factor for livestock distribution and forage utilization. Livestock limit the distance from water they travel while foraging. Forage utilization is concentrated near water. Parts of the range may be underutilized and parts may be over utilized because of limited sources of water.

Animals can be made to forage more uniformly over the range by constructing water developments in under utilized areas. This makes more forage readily available, so more animals can use the area.

Forage consumption "with water development" is compared with that for "without water development". In column 2, pounds of forage utilized (for both conditions) is recorded. The difference between the two conditions (with and without water development) is the amount of forage that can be attributed to the water development (column 3).

The conversion factor (column 4) translates this increment of increased forage consumption into AUM's. The increment of AUM's is converted to dollar benefit (column 6a) and is compared to the cost of the water developments.

A benefit/cost ratio and an internal rate of return can be computed (columns 6c and 6d).

## Fish Matrix

The fish matrix (table A-3) translates soil and water related practices into water quality and water yield impacts (column 2).

Models and relationships translate water quality and water yield characteristics into fish emergence, carrying capacity, and/or biomass (column 3).

Different soil and water related practices produced different water quality. For example, under harvesting systems, tractor logging involves skid trails, landings and roads, all sources of sediment. With proper location, construction, and closure of skid trails, landings and roads, sediment concentrations and bedload in the stream can be greatly reduced. Sediment adversely affects emergence, carrying capacity, and biomass for cold water fish.

The fish response to tractor logging with mitigation measures is estimated using models or relationships and is recorded in column 4, as is the fisheries response for tractor logging without mitigation measures.

The increment of fish produced due to implementation of soil and water measures (the difference between fisheries responses with and without mitigation—see column 4) is recorded in column 5.

There are two ways to establish value figures for the fisheries resource.

One is to convert the increment of fish into Wildlife-Fish User Days (WFUDs). A conversion factor (to convert numbers of fish to WFDs) is needed. If a conversion factor is available, multiply the increment of fish by the factor and record the WFUDs in column 6.

A WFUD has an economic value. WFUD values have been established for several areas of the country. Multiply the number of WFUDs by the WFUD value to estimate the benefit (column 7a).

The cost of soil and water input into the project and the cost of mitigation measures is summed and reported in column 7b.

A benefit/cost ratio and the internal rate of return is computed (columns 7c and 7d).

More information and data is needed to support the cells in the model. The fish model will rely on some of the fish habitat relationships models that have become available in the past few years.

Table A-3. Fish m	atrix (spec	cies-spec	ific).						
(1)	(2)	(3)	(4)	(5)	(6)		(	7)	
Soil and water	WY,	Emerg.	Number	Induced	Conv.	]	Econ	omic	5
related	WQ,	CC &	or lbs.	Output	fish/	(a)		(c)	
practices	T	Biomass	of fish	of fish	WFUDs	В	C	B/C	IRR
Instream flow									
needs	177 110 m	7	* 7						
Managed	WY, WQ, T	R	Ya	37 - 371.	CIDIID -	Φ.	ф	D / C	0/
Unmanaged	WY,WQ,T	R	Yb	Ya - Yb	WFUDs	\$	\$	B/C	70
Road									
Location									
Good	WQ	R	Yc						
Poor	WQ	R	Yd	Yc - Yd	WFUDs	\$	\$	B/C	%
Construction									
Construction Good	WQ	R	Ye						
Poor	Barriers to		Yf	Ye - Yd	WFUDs	\$	¢	B/C	9/
FOOT	migration	<i>3</i> K	11	16 10	MI ODS	Ψ	Ψ	Б/С .	/0
	8								
Housesting and									
Harvesting syst. Tractor	WY, WQ	R	V~						
Cable	Lg. organic		Yg Yh	Yh - Yg	WFUDs	\$	\$	B/C	0/
High lead	debris	R	Yi	Yi - Yg	WFUDs	\$	\$	B/C	
nigh lead	debris	N	11	11 - 1g	WEODS	Ψ	Ψ	Б/С	/0
Shade strips	Shade	R	Yj	Yj - Yg	WFUDs	\$	\$	B/C	%
	Detritus								
	Sediment								
Site preparation	(Same app:	roach)							
Range Management	(Same app	roach)							

# Enhanced Water Matrix

The enhanced water matrix evaluates soil and water practices in terms of downstream users of water, for example to municipal water supplies and for irrigation.

A few soil and water related practices are listed in column 1 (table A-4): logging systems, roads and recreation. Other practices can be listed, but for the purposes of this effort, these were the examples chosen.

These practices affect water quality and water yield (see column 2). Different soil and water practices produce different concentrations of nutrients, sediment and organic matter, and different stream temperatures.

Roads also add salt and oils in runoff. Recreation activities can increase fecal coliform levels in water. If water is impacted by these activities, the cost of water treatment for domestic water supply companies is affected.

Table A-4. Enhanced	water matrix							
(1)	·(2)	(3)	(4)	(5)		(6	)	
Soil and water	Water	Convers.	Treatment	Increm.	E	Con	omic	3
related	quality,	factors	cost or	treatment	(a)	(b)	(c)	(d)
practices	yield &		value	savings	В	С	B/C	
	timing.			or value.				
Logging systems		_						
Tractor	WY,WQ,T	Down-	\$i		•	•	/	
Cable	tt	stream	\$ii	\$i - \$ii	\$	\$	B/C	%
High lood	11	value =	\$iii	<b>C: C:::</b>	\$	\$	D/C	0/
High lead		value -	ΦΤΤΤ	\$i _ \$iii	Ф	Ф	B/C	/0
		f(WY).						
		Treat-						
		ment cost						
		= f(WQ).						
Roads								
Location	**	**	\$iv					
Construction	11	**	\$v	\$iv - \$v	\$	\$	B/C	%
				,				
Recreation								
Swimming	WQ	**	\$vi					
Fishing	tt	11	\$vii	\$vi - \$vii	\$	\$	B/C	%

Water treatment costs increase as the concentration of a pollutant increases (column 3). With the new EPA regulations, if concentrations increase above a threshold, full treatment is required. Thus, water treatment cost can take a quantum leap. Relationships of treatment costs as a function of pollutant concentration are needed (column 3).

Under logging systems, tractor logging may yield more sediment than a cable system. The sediment yield from tractor logging will cost \$i to treat (column 4). The cost to treat the sediment from cable logging is \$ii(column 4).

If cost \$ii is less than cost \$i, a treatment cost savings (\$i - \$ii) is reported in column 5.

Treatment cost savings are converted to present value and reported as the benefit (column 6a).

Costs of planning and implementing sediment control measures are reported as current costs in column 6b.

A benefit/cost ratio and an internal rate of return are computed (columns 6c and 6d).

The way timber is harvested can affect water yield (column 2). If water yield is increased and the resulting water results in more households being served, in more agricultural land brought into production, or in more crop yield per acre, the increased water yield has value. Conversion relationships or factors to convert water yield into downstream value are needed (column 3).

The downstream value of water yield from various harvesting systems is recorded in column 4.

The increment of increased downstream value is reported in column 5.

The downstream value is converted to present value or economic benefit (column 6a). The cost of designing and implementing the harvesting system to increase water yields is recorded in column 6b.

The benefit/cost ratio and an internal rate of return are computed (columns 6c and 6d).

## Road Matrix

The road matrix is fairly straight forward (table A-5). In column 1, several soil and water related road practices are listed: location, drainage, culvert sizing, revegetation of cut and fill slopes, and road surfacing.

The cost of construction with and without the soil and water measures are recorded in column 2.

Often soil and water measures influence maintenance costs. The maintenance costs for with and without watershed treatments are reported in column 3.

Sometimes watershed measures lower construction costs and the increment of construction cost saved is recorded in column 4. In some cases, soil and water practices may increase construction costs. The increment of increased cost is then reported in column 4.

Watershed related practices can reduce or increase maintenance costs and the increment of reduced or increased costs in reported in column 5.

Table A-5 Road matrix							
(1)	(2)	(3)	(4)			5)	
Soil and water	Construction		Cost Savings			omics	
related	cost	cost				(c)	
practices				В	C	B/C	IKK
Location							
Good	\$g	\$g					
Poor	\$p	\$p	\$g - \$p	\$	\$	B/C	%
	-					•	·
Construction	•	•					
Good Poor	\$g	\$g	e e	e	\$	D / C	0/
Poor	<b>\$</b> p	<b>\$</b> p	<b>\$g - \$</b> p	\$	Э	B/C	%
Drainage							
Good	\$g	<b>\$</b> p	\$g <b>-</b> \$p	\$	\$	B/C	%
Poor	\$g	<b>\$</b> p	<b>\$g - \$p</b>	\$	\$	B/C	%
Gul and Gi in-							
Culvert Sizing Proper size	\$ps	\$ps					
Too small	sps \$sm	\$sm	\$ps - \$sm	\$	\$	B/C	%
100 Small	ψЗШ	ψЗш	ФРЗ ФВШ	Ψ	Ψ	Б, С	/0
Revegetate Cut &							
Fill Slopes	•	•				- /-	4
Seed & mulch	\$m	\$m	\$u - \$m	\$	\$	B/C	%
Seed, mulch & fert.	<b>\$</b> f	<b>\$</b> f	\$u - \$f	\$	\$	B/C	%
		•		Ť	Ť	-, -	,,
			,				
Hydroseed	\$h	\$h	\$u - \$h	\$	\$	B/C	%
Untrooted	\$u	¢.,					
Untreated	Φu	\$u					
Road Surfacing							
Surfaced	\$\$s	\$\$s	\$\$s - \$\$u	\$	\$	B/C	%
Unsurfaced	\$\$u	\$\$u					

In making the economic analysis, if construction and maintenance costs are reduced, these savings are treated as benefits. If these costs are increased, then they are treated as a cost.

The increments of construction and maintenance costs savings are adjusted to present value, summed and reported as the benefit in column 6a.

The cost of providing soil and water input to the project plus the increment of increased cost for installing and maintaining the practice(s) are converted to current cost, summed, and reported in column 6b.

A benefit/cost ratio and an internal rate of return are computed (columns 6c and 6d).

Road surfacing can be analyzed in a different fashion. If soils exist that have enough natural rock and have other soils characteristics to permit road traffic without surfacing, soil and water input can save in surfacing costs.

Soils input consists of soil mapping and interpretation and water input consists of soil moisture/precipitation analysis to determine the amount of traffic the soil can handle ("trafficability"). The period of trafficability is determined for the setting and compared with the needed traffic period.

If the required traffic period is short enough, the road surface may not need to be surfaced. Thus the saving in surfacing costs is the benefit (column 6a).

The costs includes soil mapping, soil interpretations, and soil moisture, precipitation and soil trafficability analyses (column 6b). A benefit/cost ratio and internal rate of return is computed (columns 6c and 6d).

### BIBLIOGRAPHY AND DATA GENERAL COMPUTER INTERACTION

The bibliography accompanying this report has been developed as a working tool. It can be used as a source for locating specific articles at the local library. (Refer to the <u>Bibliography</u> section for explanation of the printed Bibliography accompanying this report.) It can also be used by any person familiar with the CEO system on the Data General (DG) terminals of the USDA Forest Service. (Refer to the <u>Data General Data Base and Interface with PRESENT</u> section for further discussion of the data base which stores the bibliography.)

# Bibliography

Over 700 pieces of literature were collected during the literature search. Each article was reviewed for content according to the matrices established (Appendix A). The bibliography which follows is a listing of these articles sorted according to the five emphasis areas: timber, forage, fisheries, enhanced water, and roads.

Many of the articles encompass information for more than one emphasis area. A paper such as "Cattle Grazing and Wood Production with Different Basal Areas of Ponderosa Pine" by Warren P. Clary reports both timber and forage production and, therefore, will be reported in the citations for TIMBER MATRIX - CITATIONS FOR PONDEROSA PINE as well as FORAGE MATRIX - CITATIONS FOR REGIONS 1, 2, 3, AND 4. Additionally, the five emphasis areas are further sorted into species types or geographic regions. The heading on each page of the bibliography indicates the matrix and species type or geographic region.

Each citation has been formated with the AUTHOR(S) and the DATE on the first line. The second line is the TITLE of the article. The SOURCE for the article is printed on the third line. The fourth line contains: the PAPER NUMBER assigned to each article, the soil and water related management PRACTICE, the RANGE TYPE, and the corresponding MATRIX COLUMNS relating to the specific emphasis area. (See Appendix A for an explanation of these individual columns.) To further clarify the citation, each of these parts will be dealt with individually.

AUTHOR(S)	Listed in alphabetical order.	Each emphasis area and
	corresponding subheading is a	new listing restarting
	the alphabetical order	

DATE	Date article was published.
	Different articles but with the same author(s) are listed in
	ascending order according to the date of the publication.

TITLE	Due to space limitations of the data base some titles were
	either abbreviated or some joining words left out entirely.
	Some abbreviations were used (refer to abbreviations list).

SOURCE	Publication where article resides.
	The source may be a formal journal, a U.S. government
	publication, a published conference proceedings, or an

unpublished report by an individual or agency.

U.S. Forest Service Experiment Stations are a common source for many of these articles and are usually cited:
USFS RM-145 General Technical Report. This indicates that the citation is a U.S. Forest Service, Rocky Mountain Forest and Range Experiment Station, General Technical Report Number 145. The abbreviations listing will be a quick reference for all these types of papers.

### PAPER NUMBER

This is a reference number corresponding to each unique article. A library of all articles listed in the bibliography is maintained by\_\_\_\_\_. If a particular article cannot be located, a request of this office can be made. Refer to the paper number with the request.

#### PRACTICE

Each article deals with a specific practice relating to soil and water resource management or impacts. The practice is listed in this column. However, some articles are general, or report multiple management practices. In such cases this column lists broader categories such as Multiple, General Watershed Management, General Paper, Economic Analysis, etc. Any unpublished reports from National Forest offices are listed as Forest Report in this column.

#### RANGE TYPE

The Map of Forest and Range Ecosystems of the U.S.-1977 (Garrison et al. 1977. Vegetation and Environmental Features of Forest and Range Ecosystems. USDA Forest Service, Agriculture Handbook No. 475) is the classification system used to label range types. This column is not included for the timber emphasis area.

# MATRIX COLUMNS

These columns differ for each of the five emphasis areas. Appendix A deals specifically with the matrices used and gives a detailed explanation of each column.

An (X) has been used to indicate that the particular citation includes information relating to the specific column or contains sufficient data to develop the information needed for the column. A ( $^{\sim}$ ) or a blank space in the column indicate that no such information exists. The ECONOMICS column gives abbreviations for economic information reported in the article: B (Benefit), C (Cost), B/C % (Benefit-Cost Ratio), and IRR (Internal Rate of Return). Again, this information is directly reported or can be determined by the information provided in the article.

Due to space limitations many abbreviations were used in these matrix columns (refer to the Abbreviations List).

# Abbreviations, Expansions and Definitions

These abbreviations are found in the citations or headings of the bibliography accompanying this report.

## TITLE and SOURCE:

Abbreviations of State names follow the U. S. Postal Service system (e.g., CO for Colorado, IL for Illinois)

# Federal Agencies:

FS United States Forest Service SCS United States Soil Conservation Service

TVA United States Tennessee Valley Authority
USDA United States Department of Agriculture

USFS United States Forest Service

USDI United States Department of Interior

WO Washington Office of the U. S. Forest Service

## USDA Forest Service Experiment Stations:

INT Intermountain Forest and Range Experiment Station

NC North Central Forest Experiment Station
NE Northeastern Forest Experiment Station

PNW Pacific Northwest Forest and Range Experiment Station
PSW Pacific Southwest Forest and Range Experiment Station

RM Rocky Mountain Forest and Range Experiment Station

SE Southeastern Forest Experiment Station

SO Southern Forest Experiment Station

FPL Forest Products Laboratory

## USDA Forest Service Regions:

Region 1, Northern

Region 2, Rocky Mountain

Region 3, Southwestern

Region 4, Intermountain

Region 5, Pacific Southwest

Region 6, Pacific Northwest

Region 8, Southern

Region 9, Eastern

Region 10, Alaska

## Other Abbreviations:

Conf (conference)

Proc (proceedings)

GTR (General Technical Report)

S (sulphur)

N (nitrogen)

FOR (forest or forestry)

RNG (range)

#### MATRIX COLUMNS:

### Timber Citations:

Seed Sap Growth (Seedling and Sapling Growth)
Pole & Saw (Pole and Sawtimber Growth)
Growth Curves (Height Growth Curves)
G and Y Tables (Growth and Yield Tables)

## Forage Citations:

Pounds Forage (Pounds of Forage)
Conversion to Number Animals (Conversion Factor to Number of Animals)
Induced Number Animals (Induced Number of Animals)

## Fisheries Citations:

WQ WY WT FH (Water Quality, Water Yield, Water Timing, Fish Habitat:
all of these are in column 2 of the matrix in Appendix A.)

EM CC BM (Emergence, Carrying Capacity, Biomass Model: All of these
make up column 3 of the matrix in Appendix A.)

Numbers/Pounds (Numbers or Pounds of Fish)

Increment (Induced Increment of Fish)

Convert to WFUD (Conversion of Fish to WFUDs)

### Enhanced Water Citations:

WQ WY WT (Water Quality, Water Yield, Water Timing: All of these make up column 2 of the matrix in Appendix A.)

Conversion Relations (Conversion Relationships)

Cost or Value (Treatment Cost or Value of Water)

Savings Increment (Increment of Treatment Savings or Water Value)

## Road Model:

Construction Cost (Construction Costs)
Maintenance Cost (Maintenance Costs)
Construct Increment (Construction Cost Increment)
Mainten Increment (Maintenance Cost Increment)

STOP HERE IF YOU ARE ONLY INTERESTED IN THE FOLLOWING 'HARDCOPY' BIBLIOGRAPHY

CONTINUE FOR INFORMATION ON THE BIBLIOGRAPHY DATABASE, IMPORTING THE DATA BASE INTO YOUR OWN DG SYSTEM AND USING DG SOFTWARE FOR MANIPULATING THIS DATA

## USDA Forest Service Data General Data Base and Interface with PRESENT

To facilitate the cataloguing process, each article was entered in a Data Table using the DG software, CEO Decision Base Data Table Processor. To sort and develop the printed copies which form the accompanying bibliography of this report, PRESENT Information Presentation Facility, a software package available on the DG, was used.

This Data Table has been stored so that a copy of it can be retrieved by any person wishing to do her/his own sorting using PRESENT or other report formatting software available with the DG system. The process for this will be explained in detail in the Retrieval and Import sections.

# Bibliography Storage in Data Table

The Data Table created in CEO is a listing, by row, of each article reviewed. The rows are divided into 64 columns, each of which describes a single attribute of the article's information as relates to the matrices (described in Appendix A) or other pertinent information. The following is a listing of these columns and their parameters.

Column Definitions

NO.	COLUMN NAME (abbreviation description)	COLUMN TYPE
1	Paper Number	text,left-justified
2	Geographic Region	text, left-justified
3	Author1	text, left-justified
3 4	Author2	text,left-justified
5	Date	text, centered
6	File Location	text, centered
7	Title	text, left-justified
8	Source	text, left-justified
9	Timber	text, centered
10	Forage	text, centered
11	Water	text, centered
12	Fish	text, centered
13	Roads	text, centered
14	Wildlife	text, centered
15	Recreation	text, centered
16	LBP (loblolly pine)	text, centered
17	SP (slash pine)	text, centered
18	LLP (long-leaf pine)	text, centered
19	SDP (sand pine)	text, centered
20	PP (ponderosa pine)	text, centered
21	LP (lodgepole pine)	text, centered
22	JP (jack pine)	text, centered
23	RP (red pine)	text, centered
24	DF (Douglas-fir)	text, centered
25	M (maples)	text, centered
26	0 (oaks)	text, centered
27	Practice	text, left-justified
28	Stocking Level	text, centered
29	Seed Sap Growth (seedling and sapling growth)	text, centered
30	Pole Sawtimber (pole and sawtimber growth)	text, centered
31	Growth Curves (height-growth curves)	text, centered

32 33 34 35 36 37 38 39 40 41 42 43	Soil Site (soil/site relationships) G and Y Tables (growth and yield tables) Economics Computer Models Range Type Cow Elk Deer Other Animal Pounds of Forage Induced Resource Output Conversion Number Animals (conversion factor to number of animals)	text, text, text, text, text, text, text, text, text,	centered centered centered centered left-justified centered centered centered centered centered centered centered centered
44	Induced Number Animals (induced number of animals)		centered
45	Water Quality	-	centered
46	Water Yield	-	centered
47	Water Timing		centered
48	Fish Hab (fish habitat)		centered
49	Trout	-	centered
50	Salmon	-	centered
51	Other Fish	-	centered
52	No Fish Reported		centered
53	Fish E C B (fish emergence, carrying capacity, and biomass models)	text,	left-justified
54	Fish No Lb (number or pounds of fish)	text.	centered
55	Fish Incr (induced increment of fish)	-	centered
56	Fish To WFUD (conversion of fish to WFUDs)	-	centered
57	Water Conversion Relation (conversion relationships)		centered
58	Water Cost Or Value (treatment cost or value of water)	-	centered
59	Water Savings Increment (increment of treatment		centered
	savings or water value)	,	
60	Construction Cost (construction costs)	text.	centered
61	Maintenance Cost (maintenance costs)		centered
62	Construction Increment (construction cost increment)	-	centered
63	Maintenance Increment (maintenance cost increment)		centered
64	Anadromous (anadromous fish)	-	centered
	· · · · · · · · · · · · · · · · · · ·		

Most entries in these columns are: 1) text strings; 2) an (X) indicating existing information in the particular article; and 3) a (~) or blank space indicating no information for the column reported in the particular article.

There are four exceptions to these types of entries.

Column #2, Geographic Region: the entries are E (USFS Regions 8 and 9); M (Regions 1-4); W (Regions 5, 6, and 10); ALL (entire U.S.); or blank space (no region specified in the article).

Column #6, File Location: this is a bookkeeping column, therefore, ignore.

Column #34, Economics: the entries B (benefits), C (costs), B/C % (benefit-cost ratio), and IRR (internal rate of return) are reported in the 'hardcopy' bibliography, singly or in combination.

Column #53, Fish E C B: the entries E (emergence), C (carrying capacity), and B (biomass models) are reported in the 'hardcopy' bibliography, singly or in combination.

The bibliography is an expanding as well as a working tool, because the data table has the capability to store 9,999 rows and 99 columns. Therefore, additional citations will be added periodically. Individuals are encouraged to send published studies and published or unpublished reports documenting soil and water practices (especially those which quantify the economic benefits derived from those practices) to \_\_\_\_\_\_\_. These will then become a part of the data base.

## Manipulating the Data Table

PRESENT Information Presentation Facility Data General software was used to produce the bibliography accompanying this report. PRESENT allows the user to select data from the data table, sort the data, and to format the data into a report. Queries are written which interact with the data base to produce these reports. PRESENT Information Presentation Facility User's Manual more fully explains PRESENT queries and accompanying commands. A copy of this manual can be obtained from your DG Systems Manager.

The query which produced the bibliography for "Forage Matrix - Citations for Regions 1, 2, 3, and 4" follows.

TITLE "FORAGE MATRIX - CITATIONS FOR REGIONS 1, 2, 3 AND 4" CENTER

```
REPORT 1 AUTHOR1 LEFT AUTHOR2 COLUMN +1 DATE COLUMN +1
REPORT 2 TITLE COLUMN +2
REPORT 3 SOURCE COLUMN +2
REPORT 4 PAPER NUMBER COLUMN +2 PRACTICE COLUMN +7 RANGE TYPE COLUMN +5
POUNDS OF FORAGE COLUMN +3 INDUCED RESOURCE OUTPUT COLUMN +3
CONVERSION NUMBER ANIMALS COLUMN +3 INDUCED NUMBER ANIMALS COLUMN +3 ECONOMICS
COLUMN +3
REPORT 7
SORT AUTHOR1 DATE
NOHEADERS 1 2 3
HEADER AUTHOR1 " "
HEADER AUTHOR2 " "
HEADER DATE " "
HEADER PAPER NUMBER "CITATION"
HEADER PRACTICE "PRACTICE"
HEADER RANGE TYPE "RANGE TYPE"
HEADER POUNDS OF FORAGE "POUNDS" "FORAGE "
HEADER INDUCED RESOURCE OUTPUT "INDUCED" "RESOURCE" "OUTPUT"
HEADER CONVERSION NUMBER ANIMALS "CONVERSION" "TO NUMBER" "ANIMALS"
SEADER INDUCED NUMBER ANIMALS "INDUCED" "NUMBER" "ANIMALS "
HEADER ECONOMICS "ECONOMICS"
SELECT FORAGE = "X" AND GEOGRAPHIC REGION = "ALL " OR "M " OR "E,M" OR
"M,W " OR "E,M,W"
PAGESIZE 62 lines 132 COLUMNS
```

The highlighted command phrase, SELECT FORAGE = "X", can be changed to select other information from the bibliography data table. For example, if citations reporting instream flow requirements for river boating are needed, the command, SELECT RECREATION = "X" AND WATER YIELD = "X" will pull those citations from the data table. Of course, corresponding commands (i.e., REPORT 4 and HEADER must also be adjusted, and other commands can be changed to suit personal requirements.

The bibliography data table, BIBLIOGRAPHY.DTB, is stored in IS. Through a series of steps the entire bibliography can be copied into the DG user's own CEO staff space as a data table. A sample query for each of the five emphasis areas has been stored in a "dump" file, QUERIES.DTB. This "dump" file can also be copied into the DG user's own CEO staff space and can be used as a formatting guide and easy reference for writing other queries. (Note: The user is only retrieving a copy of the bibliography data table, therefore no damage to the original data table, due to user error, is possible.) Both of these files can be accessed by following the RETRIEVAL and IMPORT steps in the next section.

# Bibliography Data Table and Dump File Retrieval

Use IS Retrieval to obtain the current copy of the bibliography data table or the queries dump file. Before retrieval confirm that you have sufficient space in your IS folder to store the file and its contents. For this data table 1000 blocks of IS and CEO space is needed. Extra space may be needed to store files generated during runs.

The steps listed below should help you with the retrieval process.

To retrieve:

Enter IS:

#### IS MAIN MENU

Select 3. Utilities

Select 6. Retrieval and FCCC Access

Select 1. Retrieval

Location of File to be Retrieved (type in the underlined items)

Host Name: s28a

Level (1. Public, 2. Staff): 1. Public

Drawer Name: distribution

Folder Name: system

File Name: bibliography.dtb or queries.dtb

Location into which to put the file

Level

Drawer Name:

Folder Name:

File Name:

This is the location in IS-CLI on the user's DG system where the data table or queries will be stored. The Level must be staff or public. The Drawer and Folder can either be public or the user's staff space.

Shall I retrieve the File now?

Type Y or N (If N, you will be prompted for a time)

A message describing the success or failure of the retrieval will be generated and sent to your inbox.

# Bibliography Data Table and Dump File Import to CEO

Documentation is contained in two WRD files, DOCI and DOCII. They are retrieved as described above and then must be imported into CEO.

To import:

#### CEO Main Menu

Select

5. Filing

Select

7. Import

Type filename (instructions below)

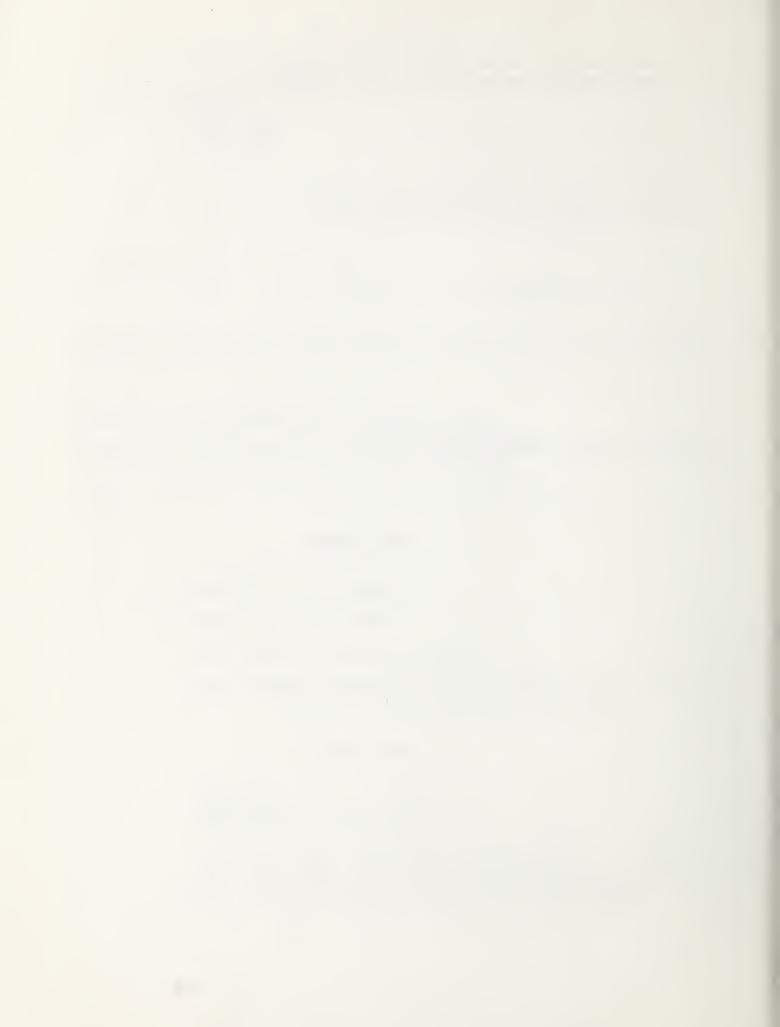
Type in complete pathname where file is stored in CLI or IS-CLI. :public:distribution:system:bibliography.dtb

## Filing Menu

Drawer	name _	
Folder	name	
Documer	nt name	

Type in the Drawer, Folder, and Document name where the data table and/or queries will be stored in personal or staff CEO space. The user will be prompted to fill in the document summary. Then the requested file will be imported into this

named document. After successful import the DOCI and DOCII files may be deleted from personal/staff IS-CLI space.











aTC409 .S65 1988 v.2

States ....tment of Agriculture

Forest Service

Watershed and Air Management Staff

Washington, D.C.

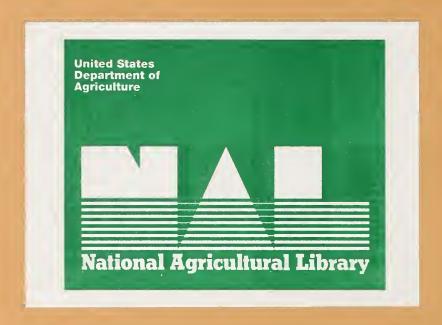


December 1987

#### Soil and Water Resource Management: A Cost or A Benefit?

Approaches to Watershed Economics Through Example

Bibliography Part II, Appendix B



United States Department of Agriculture

Forest Service

Watershed and Air Management Staff

Washington, D.C.



December 1987

#### Soil and Water Resource Management: A Cost or A Benefit?

Approaches to Watershed Economics Through Example

Bibliography Part II, Appendix B



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Douglas fir Jack Pine Loblolly Pine Lodgepole Pine Longleaf Pine Maples Oaks Ponderosa Pine Red Pine Sand Pine Slash Pine	139 153 157 181 187 195 199 205 221 227

CITATIONS FOR ENHANCED WATER MODEL



CITATION	PRACTICE	RANGE TYPE	TW YW DW	CONVERSION	COST OR	SAVINGS INCREMENT	ECONOMICS
ALDON, EARL F. MICRO-CATCHMENT VEG RECLAM OF MI	DON, EARL F. MICRO-CATCHMENT WATER HARVESTING VEG RECLAM OF MINE WASTES & TAILINGS IN	1980 IN SW, UNIV OF AZ-MINE RECLAMATION CENTER	TION CENTER				
PAPER NO. 391	VEGETATIVE MGMT	DESERT GRASSLAND	· ×		,	,	<b>.</b> .
ANDERSON, HENRY W. FORESTS & WATER: USFS PSW-18 GENE	DERSON, HENRY W. ET AL FORESTS & WATER: EPPECT OF POREST MGMT ON FLOODS, USFS PSW-18 GENERAL TECHNICAL REPORT	1986 N FLOODS, SEDIMENTATION & WATER SUPPLY	ATER SUPPLY				
PAPER NO. 719	GENERAL WATERSHED MGMT	,	× × ×	•		•	1
BAKER, MALCHUS B., JR. HYDROLOGIC REGIMES O USFS RM-90 GENERAL T	KER, MALCHUS B., JR. HYDROLOGIC REGIMES OP FORESTED AREAS IN THE USFS RM-90 GENERAL TECHNICAL REPORT	1982 THE BEAVER CREEK WATERSHED					
PAPER NO. 517	GENERAL	PORESTED	, ×		,	,	
BAKER, MALCHUS B., JR. CHANGES IN STREAMFLO WATER RESOURCES RESE	KER, MALCHUS B., JR. CHANGES IN STREAMPLOW IN AN HERBICIDE-TRE WATER RESOURCES RESEARCH 20(11):1639-1642	KER, MALCHUS B., JR. CHANGES IN STREAMPLOW IN AN HERBICIDE-TREATED PINYON-JUNIPER WATERSHED IN WATER RESOURCES RESEARCH 20(11):1639-1642	HED IN AZ				
PAPER NO. 513	VEGETATIVE MGMT	PINYON-JUNIPER	, ×			,	ı
BAKER, MALCHUS B., JR. EFFECTS OF PONDEROSA	KER, MALCHUS B., JR. EFFECTS OF PONDEROSA PINE TREATMENTS ON WATER YIELD IN ARIZONA	1986 WATER YIELD IN ARIZONA					
WATER RESOURCES PAPER NO. 488	WATER RESOURCES RESEARCH 22(1):07-73 PAPER NO. 488 VEGETATIVE MGMT	PONDEROSA PINE	× ×		,	,	

CITATION PRACTICE		RANGE TYPE	TW WW DW	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
COON CREEK WATER YIELD AUGMENTATION PILOT CONF PROC WATER FOR 21ST CENTURY: WILL IT PAPER NO. 484 VEGETATIVE MGMT	PROBE	1984 E7, S. STED	METHODIST UNIV:240-251 - x -	,	1		
1984 IMPACTS OF GRAZING INTENSITY & SPECIALIZED GRAZING SYSTEMS ON WATERSHED CHARAC DEVELOPING STRATEGIES FOR RANGELAND MANAGEMENT, WESTVIEW PRESS, BOULDER, CO PAPER NO. 411 GRAZING SYSTEM VARIOUS	SPECIALIZED GRAZII Land management, i Em	1984 ALIZED GRAZING SYSTEMS ON WATERSHED CHA MANAGEMENT, WESTVIEW PRESS, BOULDER, CO VARIOUS	RSHED CHARAC ULDER, CO X X -		,	,	,
BROOKSHIRE, DAVID S. ET AL EXISTENCE VALUES & NORMATIVE ECONOMICS: IMPLICATION FOR VALUING WATER RESOURCE WATER RESOURCES RESEARCH 22(11):1509-1518 PAPER NO. 437 GENERAL PAPER	CONOMICS: IMPLICAT:1509-1518	1986 TON FOR VALUING WA	TER RESOURCE				o,
BROWN, THOMAS C. CHAPARRAL CONVERSION POTENTIAL IN AZ, USFS RM-127 RESEARCH PAPER PAPER NO. 521 VEGETATIVE MGMT	IN AZ, PART II: AI	1974 Part II: an Economic analysis Chaparral	' × ×	×	×	×	B, C, B/C
BROWN, THOMAS C. MONETARY VALUATION OF TIMBER, FORAGE, USFS RM-95 GENERAL TECHNICAL REPORT PAPER NO. 734 ECONOMIC ANALYSIS		1982 & WATER YIELDS FROM PUBLIC POREST LANDS	OREST LANDS		×		о. С

ENHANCED WATER MODEL - CITATIONS FOR REGIONS 1, 2, 3 AND 4

NOTTABLION	PRACTICE	RANGE TYPE	TW WY	CONVERSION	COST OR	SAVINGS INCREMENT	ECONOMICS
BROWN, THOMAS C. CONSUMPTIVE USE OF	OWN, THOMAS C. ET AL CONSUMPTIVE USE OF INCREMENTAL PLOWS IN THE	1986 N THE COLORADO RIVER BASIN					
DRAFT PAPER NO. 434	VEGETATIVE MGMT	COLORADO RIVER BASIN	× ×	ı		ı	•
BROWN, THOMAS C. THE VALUE OF INCR USFS INT-215 GENE PAPER NO. 445	1986 THE VALUE OF INCREMENTAL WATER PLOW FROM PINYON-JUNIPER LANDS USPS INT-215 GENERAL TECHNICAL REPORT:177-182 PAPER NO. 445 VEGETATIVE MGMT	1986 NYON-JUNIPER LANDS 82 PINYON-JUNIPER	× ×	×	×	×	в,с,в/с
BUCKHOUSE, JOHN C. GRAZING/DEBRIS BU JOURNAL OF RANGE PAPER NO. 531	CKHOUSE, JOHN C. GIFFORD, GERALD F. GRAZING/DEBRIS BURN ON PINYON-JUNIPER SITES JOURNAL OF RANGE MANAGEMENT 29(4):299-301 PAPER NO. 531 VEGETATIVE MGMT	.D F. SITES-SOME CHEM WATER QUAL IMPLICATIONS 301 PINYON-JUNIPER X	MPLICATIONS X - x		,	•	•
BUCKHOUSE, JOHN C. WATER QUALITY IM JOURNAL OF RANGE PAPER NO. 534	CKHOUSE, JOHN C. GIFPORD, GERALD F. WATER QUALITY IMPLICATIONS OF CATTLE GRAZING JOURNAL OF RANGE MANAGEMENT 29(2):109-113 PAPER NO. 534 GRAZING	1976 NG ON SEMIARID WATERSHED IN PINYON-JUNIPER	IN SE UTAH		,		
BURROUGHS, E. R. RELATIVE EPPECTI 21ST ANNUAL ENGI PAPER NO. 620	RROUGHS, E. R. ET AL RELATIVE EPPECTIVENESS OP ROCKED ROADS AND DITCHES IN REDUCING 21ST ANNUAL ENGINEERING GEOLOGY & SOILS ENGINEERING SYMP PROC, PAPER NO. 620 ROADS	1984 DITCHES IN REDUCING SUF GINEERING SYMP PROC, U	SURFACE EROSION U OP ID:251-263	•			,

CITATION	PRACTICE	RANGE TYPE	W WY WI	3 L	CONVERSION	COST OR	SAVINGS INCREMENT	ECONOMICS
CIBOLA NATIONAL FOREST WASHITA PL-534 PROJE USFS REGION 3 PAPER NO. 698 P	IBOLA NATIONAL FOREST ** WASHITA PL-534 PROJECT - FLOOD PREVENTION USFS REGION 3 PAPER NO. 698 FOREST REPORT	1980	,	1				υ <b>κ</b>
CITY OF FORT COLLINS ANNUAL OPERATING R CITY OF PORT COLLII PAPER NO. 431	TY OF FORT COLLINS ANNUAL OPERATING REPORT, WATER AND WASTEWATER UTILITY CITY OF FORT COLLINS, COLORADO PAPER NO. 431	1985 R UTILITY MUNICIPAL	× ×	×	,	· ×	,	<b>B</b>
CLARK, EDWIN H. II THE OFF-SITE COS JOURNAL OF SOIL PAPER NO. 447	ARK, EDWIN H. II THE OFP-SITE COSTS OP SOIL EROSION JOURNAL OF SOIL AND WATER CONSERVATION 40(1):19-22 PAPER NO. 447 GENERAL PAPER	1985	×	1	×	*	1	v
CLARK, ROBERT M. COST AND BENEFI JOURNAL OF ENVI PAPER NO. 432	ARK, ROBERT M.  COST AND BENEFITS OF DRINKING WATER TREATMENT JOURNAL OF ENVIRONMENTAL SYSTEMS 14(1):1-29 PAPER NO. 432  GENERAL PAPER	1984 -	×		×	×	×	В, С
CLARY, WARREN P. WATER HOLDING C JOURNAL OF SOIL PAPER NO. 306	ARY, WARREN P. FPOLLIOTT, PETER F. 1969 WATER HOLDING CAPACITY OF PONDEROSA PINE FOREST FLOOR LAYERS JOURNAL OF SOIL AND WATER CONSERVATION 24(1) PAPER NO. 306 RANGE REHABILITATION PONDEROSA PINE	1969 EST FLOOR LAYERS PONDEROSA PINE	× ,	ı				,

CITATION	PRACTICE	RANGE TYPE	W WW WT	RELATIONS	VALUE	INCREMENT	ECONOMICS
CLARY, WARREN P. PINYON-JUNIPER (	ARY, WARREN P. PINYON-JUNIPER CONTROL - DOES IT PAY?	1974			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1 1 1	 
18TH ANNUAL ARIZ PAPER NO. 309	18TH ANNUAL ARIZONA WATERSHED SYMPOSIUM PROC:26-29 PAPER NO. 309 RANGE REHABILITATION PINYO	OC:26-29 PINYON-JUNIPER	; × ;	P	ı	ŧ	 B, C
CLARY, WARREN P. EPPECTS OF PINYC	AL REMOVAL ON	1974 NATURAL RESOURCE PRODUCTS & USES IN AZ	SES IN AZ				
USFS MM-120 MESEANCH FAFEN PAPER NO. 316 RANGE RI	EARCH FAFER RANGE REHABILITATION	PINYON-JUNIPER	× . ×	ı	1	ı	B,C,B/C
CLARY, WARREN P. MULTIPLE USE EP. WATERSHED MANAG	MULTIPLE USE EPPECTS OP MANIPULATING PINYON WATERSHED MANAGEMENT SYMPOSIUM, LOGAN, UTAH	1975 PINYON-JUNIPER 1, UTAH	· >	ı	,	,	B.C.B.
raren no. 307	NAMES ASSESSED LESS ASSESSED IN THE PROPERTY OF THE PROPERTY O						
CLARY, WARREN P.							
RANGE MGMT & ITS ECOL BASI USFS RM-158 RESEARCH PAPER	RANGE MGMT & ITS ECOL BASIS IN PONDEROSA PINE TYPE OF AZ: USFS RM-158 RESEARCH PAPER		STATUS OF KNOWLEDGE				
PAPER NO. 404		PONDEROSA PINE	' * *		1	1	D, C
CLINE, LEO D.	ET AL	1983					
EFFECTS OF HIGHWAY CONSTRUCTS RM-429 RESEARCH NOTE	UCT ON WAT	ER QUAL & BIOTA IN ADJACENT COLO MTN STREAM	O MIN STREAM				
PAPER NO. 549	ROADS	RIPARIAN	×		,	•	,

CITATION	PRACTICE	RANGE TYPE	TW WW OW	CONVERSION	COST OR	SAVINGS INCREMENT	ECONOMICS
CURRIE, PAT O. GRAZING MGMT OF	RRIE, PAT O. GRAZING MGMT OF PONDEROSA PINE-BUNCHGRASS RANGES	1975 S RANGES OF CENTRAL ROCKY MOUNTAINS	MOUNTAINS	• • • • • • • • • • • • • • • • • • •	1 1 1 1 1 1 1 1		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
USFS RM-159 RESEARCH PAPER PAPER NO. 401 MULTIPLI	SEARCH PAPER MULTIPLE	PONDEROSA-BUNCHGRASS	× ×	•	,	,	ŧ
CUSTER NATIONAL POREST FOREST REPORT USFS REGION 1	POREST	1987					
PAPER NO. 693	POREST REPORT		· ·	1		ı	ŧ
DARLING, LESLIE A. EFFECTS OF LIVES COPIES AVAILABLE	COLTHARP, GE FTOCK GRAZING ON THE : UPON REQUEST	ORGE B. 1973 WATER QUALITY OP MOUNTAIN STREAMS	S W V				
PAPER NO. 533	GRAZING	RIPARIAN	, , ×			,	ı
DAVIS, E. A.		1981					
TEBUTHIURON RE:	TEBUTHIURON RESIDUE IN STREAMWATER FROM SWESTERN SOCIETY OF WEED SCIENCE: 1981 RES	FROM SPOT-TREATED CHAPARRAL WATERSHED IN AZ 81 RESEARCH PROGRESS REPORT:52-53	ERSHED IN AZ 53				
PAPER NO. 524		CHAPARRAL	× ×	,		,	•
DAVIS, EDWIN A. EFFECTS OF CONV WESTERN SOCIETY PAPER NO. 523	UIS, EDWIN A. EFPECTS OF CONVERT CHAPARRAL TO GRASS ON THE CHEM COMPOSITION OF STR WESTERN SOCIETY OF WEED SCIENCE: 1980 RESEARCH PROGRESS REPORT:75-77 PAPER NO. 523 VEGETATIVE MGMT CHAPARRAL	1980 SS ON THE CHEM COMPOSITION OF STREAM WATER 80 RESEARCH PROGRESS REPORT:75-77 CHAPARRAL	TREAM WATER 77 X X -		·	,	

CITATION	PRACTICE	RANGE TYPE	F3 %3	CONVERSION	COST OR	SAVINGS INCREMENT	ECONOMICS
DAVIS, EDWIN A. STREAM WATER NU		1982 WITH THE CONVERSION OF ARIZONA CHAPARRAL	CHAPARRAL			1 1 1 1 1 1 1 1 1	! ! ! ! ! ! !
USFS PSW-58 GEN PAPER NO. 526	USFS PSW-58 GENERAL TECHNICAL REPORT PAPER NO. 526 VEGETATIVE MGMT	CHAPARRAL	×	•			,
DAVIS, EDWIN A.		1984					
CONVERSION OP A WATER RESOURCES PAPER NO. 512	CONVERSION OP ARIZONA CHAPARRAL TO GRASS WATER RESOURCES RESEARCH 20(11):1643-1649 PAPER NO. 512 VEGETATIVE MGMT	GRASS INCREASES WATER YIELD & NITRATE LOSS 13-1649  CHAPARRAL  X X -	ITRATE LOSS	,	ı	,	,
DEBANO, L. P.	BANO, L. P. ET AL ENHANCEMENT OF RIDABIAN VEGETATION FOLLOW	1984					
JOURNAL OF SOIL PAPER NO. 518		#INC SHOOD CONTROL IN 42 CH 9(5):317-320 CHAPARRAL	. X .	,			
FANNIN, TIMOTHY E. MULTIPLE REGRESS	ET AL ION ANAL POR EVAL	1985 NON-PT SOURCE CONTRIBUTIONS TO WATER QUALITY	ATER QUALITY				
COPIES AVAILABLE UPON REQUEST PAPER NO. 426 GENERAL PA	LE UPON REQUEST GENERAL PAPER		, ,	,			,
FISHLAKE NATIONAL FOREST	POREST	1987					
POREST REPORT USFS REGION 4 PAPER NO. 695	FOREST REPORT		, ×		,	,	,

CITATION	PRACTICE	RANGE TYPE	WQ WY WT	CONVERSION	COST OR	SAVINGS INCREMENT	ECONOMICS
FOGEL, MARTIN M. IDENTIFICATION C	ET AL  P USES OP INCREASED ST	GEL, MARTIN M. ET AL 1985 IDENTIFICATION OP USES OP INCREASED STREAMFLOW ASSOC WITH VEG MODIFICATION	ICATION				
USFS RM, FORT CC PAPER NO. 519	USFS RM, FOHT COLLINS, COLORADO PAPER NO. 519 VEGETATIVE MGMT		, ×		,	,	<b></b>
FRAAS, ARTHUR G. MUNICIPAL WASTEW JOURNAL OF ENVIR PAPER NO. 448	AAS, ARTHUR G. MUNICIPAL WASTEWATER TREATMENT COST JOURNAL OF ENVIRONMENTAL ECONOMICS AND MAI	AAS, ARTHUR G. MUNLEY, VINCENT G. 1984 MUNICIPAL WASTEWATER TREATMENT COST JOURNAL OF ENVIRONMENTAL ECONOMICS AND MANAGEMENT 11(1984):28-38 PAPER NO. 448 GENERAL PAPER	, , *	,			v
GALLATIN NATIONAL FOREST DOCUMENTATION OP HYDRO USFS REGION 1 PAPER NO. 688 FOR	LOGIC COSTS &	1986 BENEPITS FOR SOURDOUGH E.A.	× ×	·	×	ı	<b>a</b> ,
GARN, HERBERT S. QUANTIFICATION C WATER RESOURCES PAPER NO. 565	RN, HERBERT S. QUANTIFICATION OP INSTREAM PLOW NEEDS OF WILD & WATER RESOURCES BULLETIN 22(5):745-751 PAPER NO. 565 INSTREAM PLOW NEEDS	1986 OF WILD & SCENIC RIVER FOR WATER RIGHTS	FER RIGHTS X				
GARRETT, LAWRENCE D. MULTIRESOURCE RESE WORKSHOP ON WILDLI PAPER NO. 525	RRETT, LAWRENCE D. MULTIRESOURCE RESEARCH & ITS IMPLICATIONS TO MGMT: WORKSHOP ON WILDLIFE & RANGE RES NEEDS IN N MEXICO PAPER NO. 525	1981  ONS TO MGMT: THE BEAVER CREEK BIOSPHERE IN N MEXICO & SW US, RIO RICO AZ:40-44  PNYN-JNPR & PONDRSA X	BIOSPHERE 5 AZ:40-44 X			,	,

CITATION	PRACTICE	RANGE TYPE	LB AB OF	CONVERSION	COST OR	SAVINGS INCREMENT	ECONOMICS
GARY, HOWARD L. WATERSHED MGMT	OPPORTUNITIE	1975 s for colorado front range ponderosa Pin	PONDEROSA PIN				
USPS RM-139 RESEARCH PAPER PAPER NO. 725 GENERAL	EARCH PAPER GENERAL WATERSHED MGMT	PONDEROSA PINE	× × ×	,			
GARY, HOWARD L. PATCH CLEARCUTS AM SOC CIVIL EN PAPER NO. 494	1980 PATCH CLEARCUTS TO MANAGE SNOW IN LODGEPOLE PINE AM SOC CIVIL ENGINEERS, WATERSHED MANAGEMENT SYMPOSIUM PROC 1:335-346 PAPER NO. 494 LOGGING SYSTEM FORESTED	1980 : PINE IT SYMPOSIUM PROC 1:335 FORESTED	5-346 - x -			,	ı
GIFFORD, GERALD F. INFILTRATION & E JOURNAL OF RANGE PAPER NO. 308	FFORD, GERALD P.  INPILTRATION & EROSION STUDIES ON PINYON-JUNIPER CONVERSION JOURNAL OP RANGE MANAGEMENT 23(6):402-406 PAPER NO. 308 RANGE REHABILITATION PINYON-JUNIPER	1970 UNIPER CONVERSION SITES IN PINYON-JUNIPER	S IN S. UTAH	,			ı
GIFFORD, GERALD P RUNOFP & SEDIMEI JOURNAL OF RANG PAPER NO. 325	NT YIELDS FROM RUNOFP PLOTS E MANAGEMENT 26(6):440-443 RANGE REHABILITATION	1973 ON CHAINED PINYON-JUNIPER SITE-UTAH PINYON-JUNIPER X X -	IPER SITE-UTAH X X -	,		•	,
GLENN, BRUCE P. A GUIDE TO USI USDI BUREAU OP PAPER NO. 443	ENN, BRUCE P. A GUIDE TO USING INTEREST PACTORS IN ECONONUSDI BUREAU OP RECLAMATION (DECEMBER) GPO PAPER	1970 ECONOMIC ANALYSIS OF WATER PROJECTS GPO 832-593	PROJECTS		ı	,	В,С,В/С,ІКВ

CITATION	PRACTICE	RANGE TYPE	WQ WY WT	CONVERSION	COST OR	SAVINGS INCREMENT	ECONOMICS
HEEDE, BURCHARD H. SEDIMENT SOURCE 3RD ANNUAL AGU P PAPER NO. 473	AREAS AFTER TIMBER RONT RANGE BRANCH H LOGGING SYSTEM	1983 HARVEST IN MIXED CONIPER YDROLOGY DAYS PROC, CO STATE UNIV:139-156 FORESTED X	:139-156 x		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
HEEDE, BURCHARD H. SEDIMENT SOURCE SYMPOSIUM ON EPP PAPER NO. 472	EDE, BURCHARD H. SEDIMENT SOURCE AREAS RELATED TO TIMBER HARVEST ON SYMPOSIUM ON EPPECTS OF POREST LAND USE ON EROSION PAPER NO. 472 LOGGING SYSTEM FOREST	1984 VEST ON SELECTED ARIZONA WATERSHEDS EROSION & SLOPE STABILITY:123-130 FORESTED X	WATERSHEDS :123-130 X		,	×	
HEEDE, BURCHARD H. OVERLAND FLOW & JOURNAL OF HYDRO PAPER NO. 548	EDE, BURCHARD H. OVERLAND PLOW & SEDIMENT DELIVERY: EXP WITH SMALL JOURNAL OF HYDROLOGY 72:261-273 PAPER NO. 548 ROADS PORES	1984 SUBDRAINAGE IN TED	SW PONDEHOSA	,		ı	,
HEEDE, BURCHARD H. APPLIC OF GEOMOR ZEITSCHRIFT FUR PAPER NO. 475	GEOMORPHOLOGIE N.F. LOGGING SYSTEM	1985 TIMBER HARVEST INPLUENCE ON STREAM CHANNEL SUPPL-BD 55:121-130 (BERLIN, GERMANY) FORESTED	IM CHANNEL	ı	,	,	,
HELVEY, J. D. PLANT NUTRIENT JOURNAL OF SOI PAPER NO. 522	LVEY, J. D. PLANT NUTRIENT LOSSES BY SOIL EROSION AND MASS MOVEMENT AFTER WILDPIRE JOURNAL OF SOIL AND WATER CONSERVATION 40(1):168-173 PAPER NO. 522 VEGETATIVE MGMT X	1985 ISS MOVEMENT AFTER WILDFIR::168-173	а ×	,			

CITATION	PRACTICE	RANGE TYPE	TW VW OW	CONVERSION	COST OR	SAVINGS	ECONOMICS
HIBBERT, A. R. WATER YIELD CHA USFS PSW-58 GEN PAPER NO. 516	BBERT, A. R. ET AL WATER YIELD CHANGES RESULTING FROM TREATMEN USFS PSW-58 GENERAL TECHNICAL REPORT PAPER NO. 516 VEGETATIVE MGMT	TREATMENT OF ARIZONA CHAPARRAL T					
HIBBERT, A. R. STREAMFLOW RESF AM SOC CIVIL EN PAPER NO. 515	BBERT, A. R. STREAMFLOW RESPONSE TO CONVERTING ARIZONA CHAPARRAL IN A MOSAIC PATTERN AM SOC CIVIL ENGINEERS PROC: HYDRO & WATER RES IN AZ & SW. VOL. 16:123- PAPER NO. 515 VEGETATIVE MGMT CHAPARRAL	1986 RIZONA CHAPARRAL IN A MOSAIC PATT L WATER RES IN AZ & SW. VOL. 16:1 CHAPARRAL	PATTERN 16:123-131 X X <sup>-</sup>	1			
HIBBERT, ALDEN R. CHAPARRAL CONVERSION POTEN' USFS RM-126 RESEARCH PAPER PAPER NO. 520 VEGETAT	BBERT, ALDEN R. ET AL CHAPARRAL CONVERSION POTENTIAL IN AZ, PART I: WATER YIELD RESPONSE & EPFECTS USFS RM-126 RESEARCH PAPER PAPER NO. 520 VEGETATIVE MGMT CHAPARRAL X X ~	1974 I: WATER YIELD RESPONSE & CHAPARRAL	E EPFECTS X X				
HIBBERT, ALDEN R. MANAGING VEGETA USPS RM-66 GENE PAPER NO. 510	TION TO INCREASE PLOW RAL TECHNICAL REPORT VEGETATIVE MGMT	1979 IN THE COLORADO RIVER BASIN	, ×	×	×	×	ບ <u>ໍ່</u> ສ
HIBBERT, ALDEN R. WATER YIELD IMP WATER RESOURCES PAPER NO. 511	BBERT, ALDEN R. WATER YIELD IMPROVEMENT POTENTIAL BY VEGETATION MGMT ON WESTERN RANGELANDS WATER RESOURCES BULLETIN 19(3):375-381 PAPER NO. 511 VEGETATIVE MGMT	1983 NTION MGMT ON WESTERN RANG	SELANDS	ı	•		S æ

CITATION	PRACTICE	RANGE TYPE	TW YW OW	CONVERSION	COST OR	SAVINGS INCREMENT	ECONOMICS
HIBBERT, ALDEN R. OPPORTUNITIES TO	SE WATER YLD IN THE	UNKWN SOUTHWEST BY VEGETATION MANAGEMENT	ANAGEMENT	1 1 1 1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1	 	1
USFS RM, TEMPE, ARIZONA PAPER NO. 514 VEGE	ARIZONA VEGETATIVE MGMT	VARIOUS	, ×		ı	•	·:
HINOMOTO, HIROHIDE UNIT & TOTAL COS'	NOMOTO, HIROHIDE UNIT & TOTAL COST PUNCTIONS FOR WATER TREATMENT WATER RESOURCES RESEARCH 7(5):1064-1069	1971 MENT BASED ON KOENIG'S DATA	Ŧ.				
PAPER NO. 444	GENERAL		· ·	×	×	ı	v
JOHNSON, R. ROY (ED) IMPORTANCE, PRESER	HNSON, R. ROY (ED) JONES, DALE A. (ED) 1977 IMPORTANCE, PRESERVATION AND MANAGEMENT OF RIPARIAN HABITAT: A	1977 RIPARIAN HABITAT: A SYMPOSIUM	RIUM				
USFS RM-43 GENER/ PAPER NO. 731	USFS RM-43 GENERAL TECHNICAL REPORT PAPER NO. 731 GENERAL WATERSHED MGMT	RIPARIAN	· · · ×	ı	i	ř	ř
JOHNSON, STEVEN R.	ET AL	1978					
RANGE CATTLE IMPACTS ON S' USPS RM-359 RESEARCH NOTE	FREAM WATER	QUALITY IN THE COLORADO FRONT RANGE	ANGE				
PAPER NO. 536	GRAZING	RIPARIAN			·		ı
KAUFMANN, MERRILL R.	œ	1983					
CANOPY MODEL (RM.	WU)-DETERM TRANSPIR P FOREST RESEARCH 14	E FOF	ATER USE				
PAPER NO. 492		FORESTED	, ×	ŧ	è	,	ŧ

CITATION	PRACTICE	RANGE TYPE	TW WA	CONVERSION	COST OR	SAVINGS	ECONOMICS
KAUFMANN, MERRILL R. CANOPY MOBEL (RM-C CANADIAN JOURNAL O PAPER NO. 491	UFMANN, MERRILL R. CANOPY MODEL (RM-CWU) POR DETERM TRANSPIRATION CANADIAN JOURNAL OF POREST RESEARCH 14:218-226 PAPER NO. 491 LOGGING SYSTEM FC	1984 IRATION SUBALPINE POREST I. 218-226 FORESTED	. MODEL LEVEL		,	,	
KAUFMANN, MERRILL R. MODELLING TRANSPIR SYMP BY COMM ON WA PAPER NO. 489	ATION OF SUBALPINE TERSHED MGMT/IRRIG LOGGING SYSTEM	1985 TREES IN THE CENTRAL ROCKY MOUNTAINS & DRAIN, AM SOC CIVIL ENGINEERS 1:61-68 FORESTED X - X -	OUNTAINS ERS 1:61-68	•			•
KAUFMANN, MERRILL R. NEW SILVICULTURAL SOCIETY OP AMERICA PAPER NO. 490	UFMANN, MERRILL R. NEW SILVICULTURAL OPTIONS POR TIMBER AND WATER YIELD IN THE RO SOCIETY OF AMERICAN FORESTERS NATIONAL CONVENTION PROC:237-242 PAPER NO. 490 LOGGING SYSTEM	UFMANN, MERRILL R.  NEW SILVICULTURAL OPTIONS POR TIMBER AND WATER YIELD IN THE ROCKY MOUNTAINS SOCIETY OF AMERICAN FORESTERS NATIONAL CONVENTION PROC:237-242 PAPER NO. 490 LOGGING SYSTEM FORESTED	MOUNTAINS	,	,	,	,
LEAF, CHARLES F. WATERSHED MGMT IN CENTRAL USFS RM-142 RESEARCH PAPER PAPER NO. 723 GENERAL	IN CENTRAL & SOUTHERN SEARCH PAPER GENERAL WATERSHED	1975 ROCKY MTNS: SUMMARY OP STATUS OF KNOWLEDG MGMT SAGEBRUSH X X C	S OF KNOWLEDG				•
MARTIN, KIRKE L. GIARDIA AND OT 1985 SOCIETY O PAPER NO. 541	RTIN, KIRKE L. GIARDIA AND OTHER PATHOGENS IN WESTERN WATERSHEDS 1985 SOCIETY OF AMERICAN PORESTERS NATIONAL CONVE PAPER NO. 541 RECREATION FORE	1985 ERN WATERSHEDS NATIONAL CONVENTION PROC:143-147 FORESTED	x	,		,	,

CITATION	PRACTICE	RANGE TYPE	IM AM OM	CONVERSION	COST OR	SAVINGS INCREMENT	ECONOMICS
MONZINGO, DON L., JR GIARDIA CONTAMINATI WATER RESOURCES DIV PAPER NO. 538	STEVENS, DAVID FOR ON OP SURPACE WATER: ISION, NATIONAL PARK RECREATION	SURVEY OF 3 SELECT BACKCOUNTRY SERVICE, WATER RESOURCES REPORT RIPARIAN	1986 3 SELECT BACKCOUNTRY STREAMS ATER RESOURCES REPORT 86-2 IAN X			,	
NARAYANAN, RANGESAN EVALUATION OP REC JOURNAL OP LEISUR PAPER NO. 560	REATIONAL BENEFITS E RESEARCH 18(2):11 INSTREAM PLOW NEE	1986 OF INSTREAM FLOWS 6-128 DS RIVER	× × · · ·	×	×	×	o,
NATIONAL RESEARCH ECONOMIC FEASIB DEVELOPING STRA PAPER NO. 375	NATIONAL RESEARCH COUNCIL NAT'L ACADEMY OP SCIENCES 1984 ECONOMIC FEASIBILITY AND PUBLIC RANGE INVESTMENT DEVELOPING STRATEGIES FOR RANGELAND MGMT, WESTVIEW PRESS, PAPER NO. 375 GENERAL PAPER		воигрек, со, 1984 х х -	,	•	•	B,C,B/C,IRR
NEWMAN, HOWARD C. SILVICULTURE AN USFS INT-90 GEN PAPER NO. 496	SCHMIDT, WYM. D RESIDUE TREATMENTS . ERAL TECHNICAL REPORT LOGGING SYSTEM	AN C. 1979 APFECT WATER USED BY A FORESTED	A LARCH/FIR FOREST	,	,	•	1
ORR, HOWARD K. WATERSHED MANAGEMENT IN TH USFS RM-141 RESEARCH PAPER PAPER NO. 724 GENERAL	1975 WATERSHED MANAGEMENT IN THE BLACK HILLS: THE STATUS OP OUR KNOWLEDGE USFS RM-141 RESEARCH PAPER PAPER NO. 724 GENERAL WATERSHED MGMT	1975 THE STATUS OP OUR	KNOWLEDGE X X ~ ~ ~		,		,

MUZI. FRANK WYZER INTAKE AND MANGENEUT 19(6):351-356 WYZER INTAKE AND HAUDEY BY AFFECTED BY INTENSITY OF GRAZING JOURNAL OF RANCE MANACEMENT 19(6):351-356 MIXED PRAIRIE X X	CITATION	PRACTICE	RANGE TYPE	WQ WY WT	CONVERSION	COST OR	SAVINGS	ECONOMICS
NG. ET AL 1970  R SOUTHWESTERN WILDLIFE  RESTRY (SEPT 1970):545-547  REVNOLDS, HUDSON G. 1963  LATION TO RUNOFP & EROSION ON SOME CHAPARAL WATERSHEDS OF CTR AZ  NOE MANAGEMENT 16(6):322-326  GRAZING SYSTEM  C. STEPHENSON, GORDON R. 1986  IVE COLI FROM FRANCELAND STREAMS: SOURCE, ANTIBIOTIC RESISTANCE  ES BULLETIN 22(1):39-42  RIPARIAN  ALALYSIS, SANTOCH NATIONAL RECREATION AREA  NATIONAL FOREST  HABITAT IMPROVEMENT  T	RAUZI, FRANK WATER INTAKE ANE	1 >-	1966 NSITY OF GRAZING			1 1 1 1 1 1 1 1 1		
RESTRY (SEPT 1970):545-547  RESTRY (SEPT 1970):545-547  REYNOLDS, HUDSON G. 1963  REYNOLDS, HUDSON G. 1963  LATION TO RUNOPP & EROSION ON SOME CHAPARRAL WATERSHEDS OP CTR AZ  GRAZING SYSTEM  GRAZING SYSTEM  C. STEPHENSON, GORDON R. 1986  GRAZING SYSTEM  GRAZING SYSTEM  AL POREST  GRAZING  ANALYSIS, SAWTOOTH NATIONAL RECREATION AREA  NATIONAL POREST  HABITAT IMPROVEMENT  X	JOURNAL OF RANGI PAPER NO. 535	E MANAGEMENT 19(6):351-356 GRAZING	MIXED PRAIRIE		,	t	ı	17
REVNOLDS, HUDSON G. 1963  LATION TO RUNOFF & EROSION ON SOME CHAPARRAL WATERSHEDS OF CTR AZ  NGE MANAGEMENT 16(6):322-326  CHAZING SYSTEM  CHAPARRAL  AL POREST  ANALVSIS, SAWTOOTH NATIONAL RECREATION AREA  NATIONAL POREST  HABITAT IMPROVEMENT  CHAPARRAL  CHAPARRAL	REYNOLDS, HUDSON C GAMBEL OAK FOR S JOURNAL OF PORES	SOUTHWESTERN WILDLIFE	1970					
REYNOLDS, HUDSON G. 1963  LATION TO RUNOFF & EROSION ON SOME CHAPARRAL WATERSHEDS OF CTR AZ  GRAZING SYSTEM CHAPARRAL . X	PAPER NO. 346		PONDEROSA PINE	•	ì			ı
NT 16(6):322-326  G SYSTEM  CHAPARRAL  TEPHENSON, GORDON R. 1986  M RANGELAND STREAMS: SOURCE, ANTIBIOTIC RESISTANCE  Z2(1):39-42  RIPARIAN  T IMPROVEMENT  T IMPROVEMEN	RICH, LOWELL R.	REYNOLDS, HUDSON G.	1963	2 d d d d d d d d d d d d d d d d d d d				
TEPHENSON, GORDON R. 1986  M RANGELAND STREAMS: SOURCE, ANTIBIOTIC RESISTANCE  22(1):39-42  RIPARIAN X	JOURNAL OF RANGE PAPER NO. 417	MANAGEMENT 16(6):322-326 GRAZING SYSTEM	CHAPARRAL	, , , , , , , , , , , , , , , , , , ,	,	,		<u>α</u>
C RIPARIAN X	RYCHERT, ROBERT C. LACTOSE NEGATIVE WATER RESOURCES	STEPHENSON, G COLI FROM RANGELAND BULLETIN 22(1):39-42		ISTANCE				
1986 AWTOOTH NATIONAL RECREATION AREA REST T IMPROVEMENT . X	PAPER NO. 530	GRAZING	RIPARIAN	•				ı
PROVEMENT	SAWTOOTH NATIONAL STANLEY BASIN AN	POREST -	1986 ECREATION AREA					
	USFS SAWTOOTH NI PAPER NO. 714	NTIONAL POREST HABITAT IMPROVEMENT		ł	,	,	ı	B, C, B/C

ENHANCED WATER MODEL - CITATIONS FOR REGIONS 1, 2, 3 AND 4

CITATION	PRACTICE	RANGE TYPE	TW AM OM	CONVERSION	COST OR	SAVINGS INCREMENT	ECONOMICS
SKOVLIN, JON M. IMPACTS OF GRAZ DEVELOPING STRA PAPER NO. 532	OVLIN, JON M. IMPACTS OF GRAZING ON WETLANDS & RIPARIAN HABITAT: DEVELOPING STRATEGIES FOR RNGLD MGT, WESTVIEW PRESS PAPER NO. 532 GRAZING	1984 RIAN HABITAT: A REVIEW OP OUR KNOWLEDGE WESTVIEW PRESS, BOULDER CO 1984:1001-1103 RIPARIAN X	KNOWLEDGE 4:1001-1103 X	,	,	; ; ; ; ;	ca.
SMART, ALAN W. CONSUMPTIVE WAT NEW MEXICO STAT PAPER NO. 537	ART, ALAN W. CONSUMPTIVE WATER USE IN ARTIPICIAL SNOWMAKING SANTA NEW MEXICO STATE ENGINEER OPPICE, TECHNICAL REPORT 45 PAPER NO. 537 RECREATION	LIAM M. 1985 SNOWMAKING SANTA PE SKI AREA, NEW MEXICO CHNICAL REPORT 45	EW MEXICO	,		,	,
SMITH, V. KERRY ESTIMATING WATE SOUTHERN ECONOM PAPER NO. 440	ITH, V. KERRY ESTIMATING WATER QUALITY BENEPITS: AN ECONOMETRIC SOUTHERN ECONOMIC JOURNAL:50(2):422-437 PAPER NO. 440 RECREATION	1983 NOMETRIC ANALYSIS	, , ×	×	×	×	B, C
STORMER, FRED A. IRRIGATION AND 1982 ANNUAL MEE PAPER NO. 349	ORMER, FRED A. GUTHERY, FRED S. 1982 IRRIGATION AND WILDLIPE IN THE SOUTHERN AND CENTRAL GREAT PLAINS 1982 ANNUAL MEETING, GREAT PLAINS AGRICULTURAL COUNCIL, NORTH PLATTE, PAPER NO. 349	1982 ND CENTRAL GREAT PLAINS TURAL COUNCIL, NORTH PLATTE	E, NE:41-48			,	,
STURGES, DAVID L. HYDRO RELATION ON UNDISTURE USFS RM-140 RESEARCH PAPER PAPER NO. 315 RANGE RE	ON UNDISTURB/CONVERT BIG EARCH PAPER RANGE REHABILITATION	1975 SAGEBRUSH LANDS: STATUS OF KNOWLEDGE SAGEBRUSH X X -	KNOWLEDGE X X -	,			

ECONOMICS	D, C	,	ı	,	•
SAVINGS INCREMENT	,	ı	,	ı	
COST OR	×	,	,	,	
CONVERSION	,	,		ı	
TW YW OW	STREAMFLOW: PRELIMINARY RESULTS WATER RESOURCES ASSN (JULY):53-61 SAGEBRUSH	ROCKY MTN REGION	NOIT	UBALPINE FORESTS -152 - x -	30 YEARS LATER
RANGE TYPE		OENDLE, C. A. POTENTIAL FOR WATER YIELD AUGMENTATION FROM FOREST MGMT IN ROCKY MTN REGION WATER RESOURCES BULLETIN 19(3):359-373 PAPER NO. 481 VEGETATIVE MGMT FORESTED	R.  1984  INTROL SNOWPACK ACCUMULATION  ONP PROC 1:86-97  FORESTED	OENDLE, C. A. THE EPPECT OF TIMBER HARVEST ON THE WATER BALANCE OF THE SUBALPINE SOCIETY OF AMERICAN FORESTERS NATIONAL CONVENTION PROC:148-152 PAPER NO. 482 VEGETATIVE MGMT FORESTED	1985 : POOL CREEK WATERSHED, 30 YEARS LATER 5-1922 FORESTED
PRACTICE	BLER, RONALD D. STURGES, DAVID L. WATERSHED TEST OF A SNOW PENCE TO INCREASE COLD REGIONS HYDROLOGY SYMPOSIUM, AMERICAN PAPER NO. 446 VEGETATIVE MGMT	OENDLE, C. A. POTENTIAL FOR WATER YIELD AUGMENTATION WATER RESOURCES BULLETIN 19(3):359-373 PAPER NO. 481 VEGETATIVE MGMT	OENDLE, C. A. OPTIONS FOR HARVESTING TIMBER TO CONTROL SNOWPACK A 52ND ANNUAL MEETING, WESTERN SNOW CONF PROC 1:86-97 PAPER NO. 493 LOGGING SYSTEM	OENDLE, C. A. THE EPPECT OP TIMBER HARVEST ON THE SOCIETY OP AMERICAN PORESTERS NATIOI PAPER NO. 482 VEGETATIVE MGMT	OENDLE, C. A. THE EPPECT OP TIMBER HARVEST ON THE POOL WATER RESOURCES RESEARCH 21(12):1915-1922 PAPER NO. 483 VEGETATIVE MGMT
CITATION	TABLER, RONALD D. WATERSHED TEST COLD REGIONS HY PAPER NO. 446	TROENDLE, C. A. POTENTIAL FOR WATER RESOURCES PAPER NO. 481	TROENDLE, C. A. OPTIONS FOR HAF 52ND ANNUAL MEE PAPER NO. 493	TROENDLE, C. A. THE EPPECT OP 1 SOCIETY OP AMER PAPER NO. 482	TROENDLE, C. A. THE EPPECT OF T WATER RESOURCES

HOENDLE, CHARLES A.  WATERSHED MANAGEMENT IN THE ROCKY MOUNTAINS PROC ROCKY MOUNTAIN FOREST INDUSTRIES CONF:25-45  PAPER NO. 486 VEGETATIVE MGMT FORESTED - x		OF OUR KNOWLEDGE
INTERIOR WEST WATERSHED MANAGEMENT, COOP EXTENSION, WA STATE UNIV:231-243 PAPER NO. 495 VEGETATIVE MGMT FORESTED X X	INTERIOR WEST WATERSHED MANAGEMENT, COOP EXTENSION, WA STATE UNIV:231-243 PAPER NO. 495 VEGETATIVE MGMT FORESTED X X X  TROENDLE, CHARLES A.  DEADHORSE EXPERIMENT: A FIELD VERIFICATION OF SUBALPINE WATER BALANCE MODEL USFS RM-425 RESEARCH NOTE PAPER NO. 485 VEGETATIVE MGMT FORESTED X X X  TROENDLE, CHARLES A. LEAP, CHARLES F. UNKWN HYDROLOGY, CHAPTER III AN APPROACH TO WATER RES EVAL OF NON-POINT SILVIC SOURCES, EPA-60018-80-012	09

CITATION	PRACTICE	RANGE TYPE	TW WW PW	RELATIONS	VALUE	INCREMENT	ECONOMICS
UNGER, SAMUEL G. STATE-OF-ART RE US ENVIRONMENTA PAPER NO. 441	GER, SAMUEL G.  STATE-OF-ART REVIEW: WATER POLLUTION COIUS ENVIRONMENTAL PROTECTION AGENCY, EPAPER NO. 441 GENERAL PAPER	1973 CONTROL BENEFITS AND COSTS - V EPA-600/5-73-008A	VOL. 1	×	×		B, C, B/C
USDA FOREST SERVICE EPFECT OF POREST-MANAGEME USDA FOREST SERVICE, 1971 PAPER NO. 453 LOGGIN	MANAGEMENT PRACTICES CE, 1971 LOGGING SYSTEM	1971 ON NUTRIENT LOSSES PORESTED	; ; ×			1	ı
USDA SCS SANDIA MOUNTAIN USPS REGION 3 PAPER NO. 701	DA SCS USDA PS SANDIA MOUNTAINS TRIBUTARIES OF THE RIO USPS REGION 3 PAPER NO. 701 PLOOD CONTROL	1958 RIO GRANDE WATERSHED, SANDOVAL COUNTY,	COUNTY, NM	,	ı	1	B,
WARD, PRANK A. THE DEMAND FOR NEW MEXICO STAT PAPER NO. 540	THE DEMAND FOR AND VALUE OF RECREATIONAL USE OF WATER IN NEW MEXICO STATE UNIV, AGRICULTURAL EXPERIMENT STATION, FAPER NO. 540 RECREATION	1982 SNAL USE OF WATER IN SE NEW MEXICO EXPERIMENT STATION, RESEARCH REPORT RESERVOIRS	XICO EPORT 465 X X -	ı	×	×	, m
WARD, FRANK A. OPTIMALLY MANAG 1984 NATIONAL R PAPER NO. 559	RD, FRANK A. OPTIMALLY MANAGING WILD RIVERS POR INSTREAM BENEFITS 1984 NATIONAL RIVER RECREATION SYMPOSIUM PROC, LA ST. PAPER NO. 559 INSTREAM PLOW NEEDS RIVER	1984 OPTIMALLY MANAGING WILD RIVERS FOR INSTREAM BENEFITS 1984 NATIONAL RIVER RECREATION SYMPOSIUM PROC, LA STATE UNIV:285-300 PAPER NO. 559 INSTREAM PLOW NEEDS RIVER	× × 00	×	×	×	æ O

## ENHANCED WATER MODEL - CITATIONS FOR REGIONS 1, 2, 3 AND $\boldsymbol{4}$

				CONVERSION	COST OR	SAVINGS	
CITATION	PRACTICE	RANGE TYPE	TW WW DW	RELATIONS	VALUE	INCREMENT	ECONOMICS
, L		., JR. 1984					
SEDIMENT FROM MAI	SEDIMENT FROM MANAGED PINE WATERSHED IN NORTHERN CENTRAL ARIZONA	NORTHERN CENTRAL ARIZONA					
CONF PROC SPONSOR	RED BY IRRIG & DRAIN DIV,	CONF PROC SPONSORED BY IRRIG & DRAIN DIV, AM SOC CIV ENGINEERS:552-558	558				
PAPER NO. 474	LOGGING SYSTEM	FORESTED	, ×	ı	ı		
WARRINGTON GORDON E	Ca.	22 33 22 22 2					
ESTIMATING SOIL !	ESTIMATING SOIL EROSION FOR POREST LAND M	LAND MANAGEMENT PLANNING: A PROCEDURE	EDURE				
USFS RM, FORT COLLINS, COLORADO	LLINS, COLORADO						
PAPER NO. 542	MULTIPLE	FORESTED	. ×	ı	1	ŧ	ŧ

CITATION	PRACTICE	RANGE TYPE	WQ WY WT	CONVERSION	COST OR	SAVINGS INCREMENT	ECONOMICS
ANDERSON, HENRY W. PORESTS & WATER: USPS PSW-18 GENER	DERSON, HENRY W. ET AL PORESTS & WATER: EPPECT OF POREST MGMT ON PLOODS, USPS PSW-18 GENERAL TECHNICAL REPORT	1986 PLOODS, SEDIMENTATION & WATER SUPPLY	TER SUPPLY		 		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
PAPER NO. 719	GENERAL WATERSHED MGMT		× × ×	,		ı	٠,
BLACKBURN, WILBERT H. IMPACTS OF GRAZING	H. G INTENSITY & SPECIALIZED GRAZI	ACKBURN, WILBERT H. IMPACTS OP GRAZING INTENSITY & SPECIALIZED GRAZING SYSTEMS ON WATERSHED CHARAC	HED CHARAC				
PAPER NO. 411	DEVELOFING SINAIEGIES FOR KANGELAND MANAGE. PAPER NO. 411 GRAZING SYSTEM	MENI, WESIVIEW FRESS, BOULDER, VARIOUS X	~	•	ı	•	•
BROOKSHIRE, DAVID S. EXISTENCE VALUES &	& NORMATIVE ECONOMICS: IM	OOKSHIRE, DAVID S. ET AL EXISTENCE VALUING WATER RESOURCE	R RESOURCE				
WATER RESOURCES R. PAPER NO. 437	WATER RESOURCES RESEARCH 22(11):1509-1518 PAPER NO. 437 GENERAL PAPER			,	ŧ	,	В,С
BROWN, GEORGE W. CLEAR-CUT LOGGING WATER RESOURCES RI	OWN, GEORGE W. KRYGIER, JAMES T. CLEAR-CUT LOGGING AND SEDIMENT PRODUCTION WATER RESOURCES RESEARCH 7(5):1189-1198	1971 IN THE OREGON COAST RANGE					
PAPER NO. 480	LOGGING SYSTEM	FORESTED	· · · ×		ŧ	•	1
CLARK, EDWIN H. II THE OPF-SITE COST	ARK, EDWIN H. II THE OPF-SITE COSTS OP SOIL EROSION	1985					
JOURNAL OF SOIL AN PAPER NO. 447	JOURNAL OP SOIL AND WATER CONSERVATION 40(1):19-22 Paper no. 447 General Paper	1):19-22	; ;	×	×	è	ပ

CITATION	PRACTICE	RANGE TYPE	WQ WY WT	CONVERSION	COST OR	SAVINGS INCREMENT	ECONOMICS
CLARK, ROBERT M. COST AND BENEFIT JOURNAL OF ENVIR PAPER NO. 432	ARK, ROBERT M.  COST AND BENEFITS OF DRINKING WATER TREATMENT JOURNAL OF ENVIRONMENTAL SYSTEMS 14(1):1-29 PAPER NO. 432  GENERAL PAPER	1984	, , ×	×	×	×	ن ش
CROMACK, K., JR. COMPARISON OF HA 5TH NORTH AMERIC PAPER NO. 476	OMACK, K., JR. COMPARISON OF HARVESTING METHODS & THEIR IMPACT ON 5TH NORTH AMERICAN FOREST SOILS CONP PROC:449-476 PAPER NO. 476 LOGGING SYSTEM	1978 SOILS & TED	ENVIRONMENT IN PNW	,		ı	,
DUNCAN, S. H. PEAK STREAM DISCHARGE DURING 30 NORTHWEST SCIENCE 60(4):258-264 PAPER NO. 498 LOGGING SYST	YRS OF	1986 SUSTAIN YIELD TIMBER MGMTIN WA STATE FORESTED 'X X	N WA STATE	,	,		ı
DYKSTRA, DENNIS P. COSTS OF STREAM JOURNAL OF FORES PAPER NO. 737	KSTRA, DENNIS P. FROEHLICH, HENRY A. COSTS OF STREAM PROTECTION DURING TIMBER HARVEST JOURNAL OF FORESTRY (OCT 1976):684-687 PAPER NO. 737 LOGGING SYSTEM	1976 EST	, , ×		,		v
FELLER, M. C. EFPECTS CLEARCUT WATER RESOURCES PAPER NO. 478	LLER, M. C.  EFFECTS CLEARCUT/SLASH BURNING ON STREAMWATER CHEM WATER RESOURCES RESEARCH 20(1):29-40  PAPER NO. 478  LOGGING SYSTEM FORES'	1984 CHEM & WATERSHED NUTRIENT FORESTED	ENT BUDGET	ı		,	1

ENHANCED WATER MODEL - CITATIONS FOR REGIONS 5, 6 AND 10

CITATION	PRACTICE	RANGE TYPE	TW YW OW	CONVERSION	COST OR	SAVINGS INCREMENT	ECONOMICS
FRAAS, ARTHUR G. MUNICIPAL WASTEWA JOURNAL OF ENVIRG	MUNICIPAL WASTEWATER TREATMENT COST JOURNAL OF ENVIRONMENTAL ECONOMICS AND PAPER NO. 448 GENERAL PAPER	IT G. 1984  MANAGEMENT 11(1984):28-38	, , ×	,			:
FREDRIKSEN, R. L. IMPACT TIMBER HA 4TH NORTH AMERIC PAPER NO. 479	EDRIKSEN, R. L. IMPACT TIMBER HARVEST, PERTIL & HERBI 4TH NORTH AMERICAN POREST SOILS CONP PAPER NO. 479 LOGGING SYSTEM	1973 CIDE TREAT ON STREAMWATER QUAL: PROC:283-313 FORESTED	W OR & WA	ı		×	
GLENN, BRUCE P. A GUIDE TO USING USDI BUREAU OP F PAPER NO. 443	ENN, BRUCE P. A GUIDE TO USING INTEREST PACTORS IN USDI BUREAU OP RECLAMATION (DECEMBER) PAPER NO. 443 GENERAL PAPER	1970 ECONOMIC ANALYSIS OF WATER PROJECTS GPO 832-593	JECTS	1			B,C,B/C,IRR
HINOMOTO, HIROHIDE UNIT & TOTAL COS' WATER RESOURCES PAPER NO. 444	NOMOTO, HIROHIDE UNIT & TOTAL COST PUNCTIONS FOR WATER TI WATER RESOURCES RESEARCH 7(5):1064-1069 PAPER NO. 444 GENERAL	1971 UNIT & TOTAL COST PUNCTIONS FOR WATER TREATMENT BASED ON KOENIG'S DATA WATER RESOURCES RESEARCH 7(5):1064-1069	ATA X	×	×		O
JOHNSON, R. ROY (ED) IMPORTANCE, PRESER USPS RM-43 GENERAL PAPER NO. 731	IHNSON, R. ROY (ED) JONES, DALE A. (ED) IMPORTANCE, PRESERVATION AND MANAGEMENT OP USPS RM-43 GENERAL TECHNICAL REPORT PAPER NO. 731 GENERAL WATERSHED MGMT	A. (ED) 1977 MENT OP RIPARIAN HABITAT: A SYMPOSIUM D MGMT RIPARIAN X	POSIUM	,		·	,

CITATION	PRACTICE	RANGE TYPE	TW WY WT	CONVERSION	COST OR	SAVINGS	ECONOMICS
LIACOS, LEONIDAS G. WATER YIELD AS IN JOURNAL OF RANGE PAPER NO. 415	FLUENCED BY DEGREE MANAGEMENT 15:34-42 GRAZING SYSTEM	1962 OP GRAZING IN CALIFORNIA WINTER GRASSLANDS	GRASSLANDS . X .	,		,	
MERCER, LLOYD J. THE EFFICIENCY WATER RESOURCES PAPER NO. 438	RCER, LLOYD J. MORGAN, W. DOUGLAS THE EFFICIENCY OF WATER PRICING: A RATE OF RETURN WATER RESOURCES BULLETIN 22(2):289-295 PAPER NO. 438 GENERAL PAPER	GLAS 1986 E OP RETURN ANALYSIS FOR MUNICIPAL WATER MUNICIPAL	CIPAL WATER		×	•	B,C,B/C,IRR
MEYER, P. CALCULATION OF BONNEVILLE POWE PAPER NO. 753	ET AL ENVIRON COSTS/BENEFITS A RADMIN, OFFICE OF ENVII	YER, P. CALCULATION OF ENVIRON COSTS/BENEFITS ASSOCIATED WITH HYDROPOWER DEVEL IN PNW BONNEVILLE POWER ADMIN, OPPICE OP ENVIRONMENTAL ANALYSIS, PORTLAND, OREGON PAPER NO. 753 MULTIPLE  X X X	VEL IN PNW OREGON X X X	,		,	
NATIONAL RESEARCH ECONOMIC FEASIB DEVELOPING STRA PAPER NO. 375	NATIONAL RESEARCH COUNCIL NAT'L ACADEMY OF SCIENCE ECONOMIC FEASIBILITY AND PUBLIC RANGE INVESTMENT DEVELOPING STRATEGIES FOR RANGELAND MGMT, WESTVIPAPER NO. 375 GENERAL PAPER	S 1984 EW PRESS, BOULDER,	co, 1984 x x -	,	,		B,C,B/C,IRR
SCHULTZ, BOB POCO CREEK RESTORATION PROJIUSFS PLUMAS NATIONAL FOREST PAPER NO. 715 HABITAT	HULTZ, BOB PLUMAS NATIONAL FOREST 1987 POCO CREEK RESTORATION PROJECT: BECKWOURTH RANGER DISTRICT USFS PLUMAS NATIONAL FOREST PAPER NO. 715 HABITAT IMPROVEMENT	L FOREST 1987 URTH RANGER DISTRICT -	· ·	,			В.С.В/С

CITATION	PRACTICE	RANGE TYPE	T 3 4 5 6 7 1	CONVERSION	COST OR	SAVINGS	ECONOMICS
SHERWOOD-CALL, CAROLYN IRRIGATION AND WATER PEDERAL RESERVE BANK PAPER NO. 450	ERWOOD-CALL, CAROLYN IRRIGATION AND WATER QUALITY PEDERAL RESERVE BANK SAN PRANCISCO WEEKLY LETTER (JANUARY 2) PAPER NO. 450	1987 EKLY LETTER (JANUARY 2)	, ×	,	×	,	. B, C
SKOVLIN, JON M. IMPACTS OF GR. DEVELOPING STI	AZING ON WETLANDS & RIPA RATECIES POR RNGLD MGT, GRAZING	S. A.	884 REVIEW OF OUR KNOWLEDGE BOULDER CO 1984:1001-1103	·		,	<b>a</b>
SMITH, V. KERRY ESTIMATING WA' SOUTHERN ECON PAPER NO. 440	ET AL TER QUALITY BENEPITS: A OMIC JOURNAL:50(2):422- RECREATION	1983 N ECONOMETRIC ANALYSIS 437	, , ×	×	×	×	в, с
SULLIVAN, KATHLEEN LONG-TERM PATTER WATER RESOURCES I PAPER NO. 477	1985 LONG-TERM PATTERN OP WTR QUAL IN MANAGED WATERSHED IN OR: WATER RESOURCES BULLETIN 21(6):977-987 PAPER NO. 477 LOGGING SYSTEM FORESTED	1985 GED WATERSHED IN OR: 1. SUSPEND 7 FORESTED	END SEDIMENT	r	,	•	,
TROENDLE, CHARLES A. HYDROLOGY, CHAPTER III AN APPROACH TO WATER R PAPER NO. 500 LOG	LEAF, CHARLE III ER RES EVAL OF NON LOGGING SYSTEM	S F. UNKWN -POINT SILVIC SOURCES, EPA-60018-80-012 FORESTED X	018-80-012 - x x		,	,	

ECONOMICS	B, C, B/C	,	
SAVINGS INCREMENT		1	
COST OR	×	,	
CONVERSION	×	,	,
TW WW DW	- VOL. 1 X	, , ×	ROCEDURE X
ம	1973 CONTROL BENEFITS AND COSTS - VOL. EPA-600/5-73-008A X	1971 ON NUTRIENT LOSSES FORESTED	RRINGTON, GORDON E. ESTIMATING SOIL EROSION FOR FOREST LAND MANAGEMENT PLANNING: A PROCEDURE USFS RM, FORT COLLINS, COLORADO PAPER NO. 542 MULTIPLE
PRACTICE	UNGER, SAMUEL G.  STATE-OF-ART REVIEW: WATER POLLUTION C US ENVIRONMENTAL PROTECTION AGENCY, EP PAPER NO. 441  GENERAL PAPER	DA FOREST SERVICE  EFFECT OF FOREST-MANAGEMENT PRACTICES ON NUTRIENT LOSSES USDA FOREST SERVICE, 1971  PAPER NO. 453  LOGGING SYSTEM  FORESTED	E. EROSION FOR FOREST LAN LLINS, COLORADO MULTIPLE
CITATION	UNGER, SAMUEL G. STATE-OP-ART REV US ENVIRONMENTAL PAPER NO. 441	USDA FOREST SERVICE EFFECT OF FOREST-MANAGEME USDA FOREST SERVICE, 1971 PAPER NO. 453 LOGGIN	WARRINGTON, GORDON E. ESTIMATING SOIL EROSION FOR FORIUSES RM, PORT COLLINS, COLORADO PAPER NO. 542 MULTIPLE

CITATION	PRACTICE ET AL	RANGE TYPE	W Y W T	CONVERSION	COST OR	SAVINGS INCREMENT	ECONOMICS
FORESTS & WATER: USPS PSW-18 GENEI PAPER NO. 719	FORESTS & WATER: EPPECT OF FOREST MGMT ON FLOODS, USPS PSW-18 GENERAL TECHNICAL REPORT PAPER NO. 719 GENERAL WATERSHED MGMT -	FLOODS, SEDIMENTATION & WATER SUPPLY  X X X	ATER SUPPLY X X X			ŧ	,
ASKEW, G. R. WATER QUALITY CHI SOUTHERN JOURNAL PAPER NO. 528	KEW, G. R. WILLIAMS, T. M. WATER QUALITY CHANGES DUE TO SITE CONVERSION IN COASTAL SOUTHERN JOURNAL OF APPLIED FORESTRY 10(1986):134-136 PAPER NO. 528 VEGETATIVE MGMT FORESTED	1986 ION IN COASTAL SOUTH CAROLINA 186):134-136 FORESTED X	N A X	,	1	,	ı
AUBERTIN, G. M. WATER QUALITY AP' JOURNAL OF ENVIR PAPER NO. 470	BERTIN, G. M. WATER QUALITY AFTER CLEARCUTTING A SMALL WATE JOURNAL OF ENVIRONMENTAL QUALITY 3(3):243-249 PAPER NO. 470 LOGGING SYSTEM	H. SMALL WATERSHED IN WEST VIRGINIA 3):243-249	, , ×	r		ı	,
BEASLEY, R. S. SEDIMENT LOSS PRO JOURNAL OF ENVIRC PAPER NO. 458	ASLEY, R. S. SEDIMENT LOSS PROM POREST MGMT: MECH VS CHEMICAL JOURNAL OF ENVIRONMENTAL QUALITY 15(4):413-416 PAPER NO. 458 LOGGING SYSTEM	1986 1-MICAL SITE PREP AFTER CLEARCUTTING 3-416 RORESTED X X -	EARCUTTING X X -			×	
BEASLEY, R. SCOTT SEDIMENT LOSSES I USFS SE-24 GTR, 7	ASLEY, R. SCOTT GRANILLO, ALPREDO B. SEDIMENT LOSSES FROM POREST PRACTICES IN THE USFS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVIC PAPER NO. 465 LOGGING SYSTEM	ASLEY, R. SCOTT GRANILLO, ALPREDO B. 1982 SEDIMENT LOSSES FROM POREST PRACTICES IN THE GULF COASTAL PLAIN OF ARKANSAS USFS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONP PROC:461-467 PAPER NO. 465 LOGGING SYSTEM	ARKANSAS ROC:461-467 X - X			×	ı

CITATION	PRACTICE	RANGE TYPE	W W WT	CONVERSION	COST OR	SAVINGS INCREMENT	ECONOMICS
BEHAN, JOHN J. A NET BENEFIT MO WATER RESOURCES	HAN, JOHN J.  A NET BENEFIT MODEL FOR RECREATION PLANNING AT DRINKING WATER RESERVOIRS  WATER RESOURCES BULLETIN 21(2):297-309	1985 G AT DRINKING WATER RESEI	RVOIRS		 		1 1 1 1 1 1 1 1 1 1
PAPER NO. 539	RECREATION	RESERVOIRS	, ,			:	, B,C,B/C
BLACKBURN, W. H. LIVESTOCK GRAZING IMPAC' RANGELANDS 5(3):123-125	ACKBURN, W. H. LIVESTOCK GRAZING IMPACTS ON WATERSHEDS RANGELANDS 5(3):123-125	1983					
PAPER NO. 529	GRAZING	PLAINS GRASSLANDS	× ×	ı	·	,	•
BLACKBURN, W. H. POREST HARVESTIN FORESTRY & WATER	ACKBURN, W. H.  FOREST HARVESTING & SITE PREP IMPACTS ON STORMFLOW & WATER QUALITY FORESTRY & WATER QUALITY: MIDSOUTH SYMPOSIUM PROC, LITTLE ROCK, AK	UNKWN ON STORMFLOW & WATER QUALITY IN E. POSIUM PROC, LITTLE ROCK, AK	IN E. TEXAS				
PAPER NO. 461	LOGGING SYSTEM	FORESTED	× ×		ł	×	
BLACKBURN, W. H. WATER YIELD AND SYMPOSIUM ON WIL	ACKBURN, W. H. WOOD, J. C. WATER YIELD AND QUALITY PROM UNDISTURBED PSYMPOSIUM ON WILDERNESS & NATURAL AREAS: A	UNKWN ED PORESTED WATERSHEDS IN EAST TEXAS S: A MANAGEMENT CHALLENGE PROC	ST TEXAS				
PAPER NO. 505	VEGETATIVE MGMT	FORESTED	× ×	•	ł		,
BLACKBURN, WILBERT H. IMPACTS OF GRAZING DEVELOPING STRATEGI PAPER NO. 411	ACKBURN, WILBERT H. IMPACTS OF GRAZING INTENSITY & SPECIALIZED GRAZING SYSTEMS ON WATERSHED CHARAC DEVELOPING STRATEGIES FOR RANGELAND MANAGEMENT, WESTVIEW PRESS, BOULDER, CO PAPER NO. 411 GRAZING SYSTEM VARIOUS	1984 GRAZING SYSTEMS ON WATEI MENT, WESTVIEW PRESS, BOV VARIOUS	RSHED CHARAC ULDER, CO X X -	,		ı	

CITATION	PRACTICE	RANGE TYPE	TW WW	CONVERSION	COST OR	SAVINGS INCREMENT	ECONOMICS
BOWDEN, WILLIAM B. TRANSPORT & LOSS OF NITROL SCIENCE 233(4766):867-869 PAPER NO. 460 LOGGING	BORMANN, F. H OP NITROUS OXIDE IN ):867-869 LOGGING SYSTEM	SOIL WATER AFTER FOREST CLEAR-CUTTING FORESTED X -	SOUTHT X				·:
BROCK, J. H. INFILTRATION & S JOURNAL OF RANGE PAPER NO. 323	OCK, J. H.  INPILTRATION & SEDIMENT PRODUCTION ON DEEP HARDLAND RANGE SITE IN N. JOURNAL OF RANGE MANAGEMENT 35(2):195-198 PAPER NO. 323 RANGE REHABILITATION PAPER NO. 323	1982 HARDLAND RANGE SITE IN N. PLAINS GRASSLANDS	. CEN TX		•		
BROOKSHIRE, DAVID S. EXISTENCE VALUES & WATER RESOURCES RE PAPER NO. 437	OOKSHIRE, DAVID S. ET AL EXISTENCE VALUES & NORMATIVE ECONOMICS: IMPLICATION FOR VALUING WATER RESOURCE WATER RESOURCES RESEARCH 22(11):1509-1518 PAPER NO. 437 GENERAL PAPER	1986 PLICATION FOR VALUING WATE	ER RESOURCE		,	,	ບ <b>ໍ</b>
CLARK, EDWIN H. II THE OPP-SITE COS JOURNAL OP SOIL PAPER NO. 447	ARK, EDWIN H. II THE OPP-SITE COSTS OP SOIL EROSION JOURNAL OP SOIL AND WATER CONSERVATION 40(1):19-22 PAPER NO. 447 GENERAL PAPER	1985 1):19-22	, , ×	×	×	1	v
CLARK, ROBERT M. COST AND BENEFIT JOURNAL OF ENVIF PAPER NO. 432	ARK, ROBERT M.  COST AND BENEFITS OF DRINKING WATER TREATMENT JOURNAL OF ENVIRONMENTAL SYSTEMS 14(1):1-29 PAPER NO. 432  GENERAL PAPER	1984 SNT	' '	×	×	×	<b>9</b>

CITATION PRACTICE	RANGE TYPE	TW WW WT	CONVERSION RELATIONS	COST OR	SAVINGS INCREMENT	ECONOMICS
CORBETT, EDWARD S.  MUNICIPAL WATERSHED CONCERNS  IN: FORESTRY MGT & WATER QUALITY: PROC 1984 PA STATE FOR ISSUES CONP:120-127  IN: FORESTRY MGT & WATER QUALITY: PROC 1984 PA STATE FOR ISSUES  PAPER NO. 425  GENERAL  PAPER NO. 425	1984 4 PA STATE FOR ISSUES CON MUNICIPAL WATERSHED	P:120-127 X X -	t			45
CORBETT, EDWARD S. LYNCH, JAMES A. MANAGEMENT OP STREAMSIDE ZONES ON MUNICIPAL WATERSHEDS USPS RM-120 GENERAL TECHNICAL REPORT PAPER NO. 424 VEGETATIVE MGMT RIPARIAN	1985 11. watersheds Riparian	× ×		•		
CROKE, KEVIN ESTIMATING THE VALUE OP IMPROVED WATER QUALITY IN JOURNAL OP ENVIRONMENTAL SYSTEMS 16(1):13-24 PAPER NO. 439 GENERAL PAPER	1986 ALITY IN AN URBAN RIVER SYSTEM -24 URBAN RIVER X	Y STEM X ' '	ı	×	×	æ
1974 STORMPLOWS AND EROSION APTER TREE-LENGTH SKIDDING ON COASTAL PLAIN SOILS AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS, PAPER #74-2558 PAPER NO. 471 LOGGING SYSTEM FORESTED	1974 SKIDDING ON COASTAL PLAIN 1S, PAPER #74-2558 FORESTED	SOILS x			•	
DISSMEYER, GEORGE E. STUMP, RICHARD F PREDICTED EROSION RATES FOR POREST MGMT A USPS STATE & PRIVATE FORESTRY, SE AREA PAPER NO. 456 LOGGING SYSTEM	ARD F. 1978 MGMT ACTIVITIES & CONDITIONS SAMPLED IN NREA . X -	AMPLED IN SE			×	ı

CITATION	PRACTICE	RANGE TYPE	TW YW QW	CONVERSION	COST OR	SAVINGS INCREMENT	ECONOMICS
DISSMEYER, GEORGE E.  DEVELOPING A USLE  USDA ARS WORKSHOP  PAPER NO. 728	SSMEYER, GEORGE E.  DEVELOPING A USLE COVER-MANAGEMENT (C) FACTOR PROCEDURE POR FOREST CONDITIONS USDA ARS WORKSHOP ON ESTIM EROSION & SED YLD ON RNGLNDS PROC, ARM-W-26:166-18 PAPER NO. 728 GENERAL WATERSHED MGMT FORESTED	1981 SED YLD ON RNGLNDS PROC, ARM-W-26:166-186	CONDITIONS 1-26:166-186	,			1,
DISSMEYER, GEORGE E. ET AL SUMMARY OF MUNICIPAL WATERSHED MANA USFS NE-13 GENERAL TECHNICAL REPORT PAPER NO. 428 GENERAL PAPER	SSMEYER, GEORGE E. ET AL SUMMARY OP MUNICIPAL WATERSHED MANACEMENT SURVEYS USFS NE-13 GENERAL TECHNICAL REPORT PAPER NO. 428 GENERAL PAPER	UNKWN RVEYS IN THE EASTERN UNITED STATES MUNICIPAL WATERSHED X	WITED STATES	r		ı	
DOUGLASS, JAMES E. WATERSHED VALUES - IMPORTANT IN LA JOURNAL OP PORESTRY 72(10):617-621 PAPER NO. 502 VEGETATIVE MGMT	9	1974 USE PLANNING ON SOUTHERN FORESTS FORESTED	STS X X	×	×	×	O
DOUGLASS, JAMES E. SILVICULTURE POR WATER YIELD TOWN MEETING PORESTRY - ISSUES FOR PAPER NO. 503 VEGETATIVE MGMT	ES POR	1979 THE 1980'S, NATL CONV SOC AM FOR PROC:90-96 FORESTED	R PROC:90-96	,			
DOUGLASS, JAMES E. STORMPLOW CHANGES USFS SE-24 GTR, 2 PAPER NO. 508	UGLASS, JAMES E. ET AL STORMPLOW CHANGES AFTER PRESCRIBED BURNING & USFS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVIG PAPER NO. 508 LOGGING SYSTEM	1982 BURNING & CLEARCUTTING PINE STANDS IN SC RN SILVICULTURAL RESEARCH CONP PROC:454-460 PORESTED	NDS IN SC PROC:454-460 - X X				,

				a0	SAVINGS	
CITATION PRACTICE	RANGE TYPE	W W WT	RELATIONS	VALUE	INCREMENT	ECONOMICS
JAMES E. I. FOR WATER YIELD AUGMENTATION	1983 FROM FOREST MGMT IN THE EAST	T U.S.				
WATER RESOURCES BULLETIN 19(3):351-358 PAPER NO. 504 VEGETATIVE MGMT	FORESTED	×				
ELLEFSON, PAUL V. PROTECTING WATER QUALITY IN THE MIDWEST: IMPACT ON NORTHERN JOURANL OF APPLIED FORESTRY 2(1985):57-61 PAPER NO. 433	K D. ST: IMPACT ON TIMBER HARVESTING COSTS 2(1985):57-61 RORESTED X -	ING COSTS	4	×		o <b>' a</b>
FRAAS, ARTHUR G. MUNICIPAL WASTEWATER TREATMENT COST JOURNAL OF ENVIRONMENTAL ECONOMICS AND MANAGEMENT 11(1984):28-38 PAPER NO. 448 GENERAL PAPER	6. ANAGEMENT 11(1984):28-38	· ×				U
GLENN, BRUCE P. A GUIDE TO USING INTEREST FACTORS IN ECO USDI BUREAU OP RECLAMATION (DECEMBER) GP PAPER NO. 443 GENERAL PAPER	1970 ECONOMIC ANALYSIS OF WATER PROJECTS GPO 832-593	PROJECTS	•		,	B, C, B/C, IRR
GOLDEN, MICHAEL S.  FORESTRY ACTIVITIES & WATER QUALITY IN ALABAMA: EFFECTS, RECOMMENDED PI ALABAMA AGRICULTURAL EXPERIMENT STATION, AUBURN UNIV, AL, BULLETIN 555 PAPER NO. 452 MULTIPLE	1984 IN ALABAMA: EFFECTS, RECOMMENDED PRACTICES 'ION, AUBURN UNIV, AL, BULLETIN 555 X ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	NDED PRACTICES IN 555 X		,		

CITATION	PRACTICE	RANGE TYPE	TW VW	CONVERSION	COST OR	SAVINGS INCREMENT	ECONOMICS
HINOMOTO, HIROHIDE UNIT & TOTAL COST WATER RESOURCES R PAPER NO. 444	NOMOTO, HIROHIDE UNIT & TOTAL COST PUNCTIONS FOR WATER TREAT WATER RESOURCES RESEARCH 7(5):1064-1069 PAPER NO. 444 GENERAL	1971 TREATMENT BASED ON KOENIG'S DATA	OENIG'S DATA	×	×	,	:
HOLLIS, CHARLES A. EPPECTS OP SOME S 5TH NORTH AMERICA PAPER NO. 468	LLIS, CHARLES A. ET AL EPPECTS OP SOME SILVIC PRACTICES ON SOIL-SI 5TH NORTH AMERICAN FOREST SOILS CONP PROC:5 PAPER NO. 468 LOGGING SYSTEM	1978 OIL-SITE PROPERTIES 1 PROC:585-606 FORESTED	1978 SOIL-SITE PROPERTIES IN LOWER COAST PLAINS PROC:585-606 FORESTED X	,	•	,	
HORNBECK, J. W. STRIP CUT AS MEAN 4TH NORTH AMERICA PAPER NO. 463	RNBECK, J. W.  STRIP CUT AS MEANS OF PROTECT SITE & STREAM 4TH NORTH AMERICAN POREST SOILS CONP PROC:2 PAPER NO. 463 LOGGING SYSTEM	1973 STREAMPLOW QUAL WHEN CLEARCUT PROC:209-225 FORESTED	CLEARCUT N. HARDWOOD X X ~	,	*	×	,
HUPP, D. D. ELEMENT CYCLES & SOCIETY OF AMERIC PAPER NO. 501	ET AL ELEMENT CYCLES & WATER BUDGET ANALYSES APPL SOCIETY OF AMERICAN FORESTERS PROC:77-89 PAPER NO. 501 VEGETATIVE MGMT	1978 LED TO FOREST W FORESTED	1978 S APPLIED TO FOREST MGMT IN EAST U.S. -89 FORESTED X X ~	,	•	,	ı
HURON-MANISTEE NAT'L FORE FOREST REPORT USFS REGION 9 PAPER NO. 683 FORE	'L FORE FOREST REPORT	1985	×	,			B

CONVERSION COST OR SAVINGS WQ WY WT RELATIONS VALUE INCREMENT FORMALLE		NS X		TEUTION
CITATION PRACTICE RANGE TYPE	KOCHENDERFER, J. N. HELVEY, J. D. 1982 PROGRESS REPORT I - SOIL LOSS & UTILITY EVALUATION OP POREST ACCESS ROAD IN WV USFS NE 4300-FS-NE-1602-45 PAPER NO. 546 ROADS FORESTED	LEONARD, R. A.  HERBICIDE RUNOPP FROM UPLAND PIEDMONT WATERSHEDS - DATA & IMPLICATIONS JOURNAL OP ENVIRONMENTAL QUALITY 8(2):223-230  PAPER NO. 527 VEGETATIVE MGMT	LULL, HOWARD W.  FORESTS AND PLOODS IN THE EASTERN UNITED STATES USPS NE-226 RESEARCH PAPER PAPER NO. 429 GENERAL PAPER	LYNCH, JAMES A.  EFPECTIVENESS OF BEST MANAGEMENT PRACTICES IN CONTROLLING NONPOINT POLLUTION

BEST MGMT PRACTICES POR CONTROL NONPT-SOURCE POLLUTION ON FORESTED WATERSHEDS

JOURNAL OP SOIL AND WATER CONSERVATION 40(1):164-167

PAPER NO. 455

ET AL

LYNCH, JAMES A.

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CITATION	PRACTICE	RANGE TYPE	W W WT	CONVERSION	COST OR	SAVINGS	S A MOOR
MCMINN, JAMES W. PIRST-YEAR WATE JOURNAL OF FORE PAPER NO. 506	MINN, JAMES W.  PIRST-YEAR WATER YIELD INCREASE AFTER FOREST JOURNAL OF FORESTRY (OCTOBER 1975):654-655 PAPER NO. 506  VEGETATIVE MGMT	D. 1975 FOREST CUTTING: AN ALTERNATIVE MODEL -655 FORESTED 'X	NATIVE MODEL	,	,		
MILES, PATRICK D. ASSESS ECON IMP MASTER OF SCIEN PAPER NO. 449	LICATIONS OF MANAGING CE DEGREE, COLLEGE OP MULTIPLE	1983 NONPT FORESTRY SOURCE OF WATER POLLUTANTS PORESTRY, UNIV OF MINNESOTA (OCTOBER)	A (OCTOBER)  X X	×	×	×	B, C, B/C
NATIONAL RESEARCH ECONOMIC PEASIBI DEVELOPING STRAT PAPER NO. 375	NATIONAL RESEARCH COUNCIL NAT'L ACADEMY OP SCIENCES 1984 ECONOMIC PEASIBILITY AND PUBLIC RANGE INVESTMENT DEVELOPING STRATEGIES POR RANGELAND MGMT, WESTVIEW PRESS, BOULDER, CO, 1984 PAPER NO. 375 GENERAL PAPER ALL	:NCES 1984 IENT TVIEW PRESS, BOULDI ALL	ER, CO, 1984 X X -			,	B, C, B/C, IRR
NEARY, D. G. WATER QUAL EPHEM POREST ECOLOGY AI PAPER NO. 459	ARY, D. G. WATER QUAL EPHEMERAL POREST STREAMS AFTER SITE PREP WITH HERBICIDE HEXAZINONE POREST ECOLOGY AND MANAGEMENT 14(1):23-40 PAPER NO. 459 LOGGING SYSTEM PORESTED X	1986 E PREP WITH HERBICI PORESTED	DE HEXAZINONE X	,			
NEARY, DANIEL G. IMPACT WILDPIRE/w SOUTHERN JOURNAL PAPER NO. 462	:ARY, DANIEL G. CURRIER, JOHN B. 1982 IMPACT WILDPIRE/WATERSHD RESTORE ON WATER QUAL:S CAROLINA BLUE RIDGE MOUNTAINS SOUTHERN JOURNAL OF APPLIED FORESTRY 6(2):81-90 PAPER NO. 462 VEGETATIVE MGMT FORESTED X	1982 L:S CAROLINA BLUE R 90 PORESTED	IDGE MOUNTAINS	,		,	

CITATION	PRACTICE	RANGE TYPE	TW WW DW	CONVERSION	COST OR	SAVINGS INCREMENT	ECONOMICS
OBERTS, GARY L. POLLUTANTS ASSOC WATER RESOURCES PAPER NO. 547	ERTS, GARY L. POLLUTANTS ASSOCIATED WITH SAND AND SALT AP WATER RESOURCES BULLETIN 22(3):479-483 PAPER NO. 547 ROADS	1986 SALT APPLIED TO ROADS IN MINNESOTA 83	, v	,		,	1:
POWELL, JEFF RANGELAND WATERS US ENVIRONMENTAL PAPER NO. 409	WELL, JEFF RANGELAND WATERSHED WATER BUDGET AND GRAZINUS ENVIRONMENTAL PROTECTION AGENCY, EPA-600 PAPER NO. 409 GRAZING SYSTEM	1983 GRAZING CATTLE WASTE NUTRIENT CYCLING EPA-600/S2-83-017 TALLGRASS PRAIRIE X -	SYCLING X - X	,	,	,	,
RIEKERK, H. RESEARCH ON ENVI USPS SO-34 GTR, PAPER NO. 464	EKERK, H. RESEARCH ON ENVIRON & SITE EPFECT OF FOREST USPS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVI PAPER NO. 464 LOGGING SYSTEM	1980 FOREST MGMT PRACT IN LOWER COASTAL PLAIN SILVICULTURAL RESEARCH CONP PROC:331-338 FORESTED X -	STAL PLAIN 30C:331-338 X	,	,	,	,
SMITH, V. KERRY ESTIMATING WATER SOUTHERN ECONOMI PAPER NO. 440	ITH, V. KERRY ESTIMATING WATER QUALITY BENEPITS: AN ECONO SOUTHERN ECONOMIC JOURNAL:50(2):422-437 PAPER NO. 440 RECREATION	1983 n econometric analysis 437	, , ×	×	×	×	B, C
STONE, E. L. IMPACT OP TIMBER 5TH NORTH AMERIC PAPER NO. 469	ONE, E. L. IMPACT OP TIMBER HARVEST/REGEN SYS ON STREA 5TH NORTH AMERICAN FOREST SOILS CONP PROC:5 PAPER NO. 469 VEGETATIVE MGMT	1978 I STREAM FLOW & SOIL IN EAST DECIDUOUS REG PROC:516-535 FORESTED	CIDUOUS REG		,	,	,

CITATION	PRACTICE	RANGE TYPE	WQ WY WT	CONVERSION	COST OR	SAVINGS INCREMENT	ECONOMICS
STORMER, PRED A. IRRIGATION AND W 1982 ANNUAL MEET PAPER NO. 349	ORMER, PRED A. GUTHERY, PRED S. 1982 IRRIGATION AND WILDLIPE IN THE SOUTHERN AND CENTRAL GREAT PLAINS 1982 ANNUAL MEETING, GREAT PLAINS AGRICULTURAL COUNCIL, NORTH PL. PAPER NO. 349	RED S. 1982 THERN AND CENTRAL GREAT PLAINS AGRICULTURAL COUNCIL, NORTH PLATTE, NE:41-48	TTE, NE:41-48	ı	,		t:
SWIFT, L. W., JR. GRAVEL AND GRASS SURFACING REDUUSFS SE, COWEETA HYDROLOGIC LABPAPER NO. 544 ROADS	න ය ට	1982 SOIL LOSS FROM MOUNTAIN ROADS	, ,	•	ı	,	ı
SWINDEL, BENEE F. MULTI-RESOURCE E SOUTHERN JOURNAL PAPER NO. 355	INDEL, BENEE P. MULTI-RESOURCE EPFECTS OF HARVEST, SITE PREPAR, SOUTHERN JOURNAL OP APPLIED FORESTRY 7(1):6-15 PAPER NO. 355 VEGETATIVE MGMT	1983 SITE PREPARATION & PLANTING IN PINE PLATWDS Y 7(1):6-15 X X	PINE PLATWDS	,	ı	,	,
TRIMBLE, GEORGE R., JR. WEITZI SOIL EROSION ON LOGGING ROADS SOIL SCIENCE SOCIETY PROC:152 PAPER NO. 543 ROADS	IMBLE, GEORGE R., JR. WEITZMAN, SIDNEY SOIL EROSION ON LOGGING ROADS SOIL SCIENCE SOCIETY PROC:152-154 PAPER NO. 543 ROADS	1953	, , *	,		,	,
TROENDLE, CHARLES A. HYDROLOGY, CHAPTER III AN APPROACH TO WATER R PAPER NO. 500 LOG	OENDLE, CHARLES A. LEAF, CHARLES F. HYDROLOGY, CHAPTER III AN APPROACH TO WATER RES EVAL OF NON-POINT PAPER NO. 500 LOGGING SYSTEM	UNKWN SILVIC SOURCES, EPA-60018-80-012 FORESTED	018-80-012 - x x	1	ı	ı	ı

CITATION	PRACTICE	RANGE TYPE	WQ WY WT	CONVERSION	COST OR	SAVINGS INCREMENT	ECONOMICS
UNGER, SAMUEL G. STATE-OF-ART REVI US ENVIRONMENTAL PAPER NO. 441	GER, SAMUEL G. ET AL 19 STATE-OF-ART REVIEW: WATER POLLUTION CONTROL BENEFITS US ENVIRONMENTAL PROTECTION AGENCY, EPA-600/5-73-008A PAPER NO. 441 GENERAL PAPER	1973  CONTROL BENEFITS AND COSTS - VOL. PA-600/5-73-008A  X	OL. 1	×	×		B, C, E/C
URSIC, S. J. HYDROLOGIC EFFECT USFS SO-54 GTR, 3 PAPER NO. 467	HYDROLOGIC EFFECTS OF COMPLETE & CONVENTIOUSFS SO-54 GTR, 3RD BIENNIAL SOUTHERN SILVPAPER NO. 467 LOGGING SYSTEM	1984 ENTIONAL HARVEST OF LOBLOLLY PINE BIOMASS SILVICULTURAL RESEARCH CONP PROC:565-572 FORESTED	INE BIOMASS ROC:565-572 X		•	1	,
USDA SOURCE DISTRIBUTI KENTUCKY SPECIAL PAPER NO. 721	DA SOURCE DISTRIBUTION OP SEDIMENT BY FIRST APPROXIMATION KENTUCKY SPECIAL RESOURCE STUDY REPORT PAPER NO. 721 GENERAL WATERSHED MGMT WATERSHED	RESOURCE 1985 APPROXIMATION OP SUSPENDED WATERSHED	SEDIMENT			•	
USDA FOREST SERVICE EFFECT OP POREST-MANAGEME USDA POREST SERVICE, 1971 PAPER NO. 453 LOGGIN	MANAGEMENT PRACTICES CE, 1971 LOGGING SYSTEM	1971 ON NUTRIENT LOSSES FORESTED	, , *	,	,	,	
USDA POREST SERVICE MUNICIPAL WATERSH USFS NE-13 GENERA PAPER NO. 430	DA POREST SERVICE MUNICIPAL WATERSHED MANAGEMENT SYMPOSIUM PROCEEDINGS (ENTIRE) USFS NE-13 GENERAL TECHNICAL REPORT PAPER NO. 430 GENERAL PAPER	1975 ROCEEDINGS (ENTIRE) MUNICIPAL WATERSHED	× × ×	,			

NOTHER	PRACTICE	RANGE TYPE	WQ WY WT	CONVERSION	COST OR	SAVINGS INCREMENT	ECONOMICS
USFS NORTHEASTERN EXP STA	EXP STA	1986					
FOREST REPORT USFS NE POREST PAPER NO. 702	FOREST REPORT USFS NE POREST EXPERIMENT STATION PAPER NO. 702 FOREST REPORT	WATERSHED	× ×		,	ŧ	B, C, B/C
USFS SE FOREST EXP STA WATER YIELD STUDIES . USFS SE FOREST EXPER PAPER NO. 507	FS SE FOREST EXP STA WATER YIELD STUDIES AT COWETTA HYDROLOGIC LABORATORY USFS SE FOREST EXPERIMENT STATION PAPER NO. 507 VEGETATIVE MGMT FORESTE	UNKWN LABORATORY FORESTED	× ×	,		4	t
VARIOUS FOREST REPORT CHATTAHOOCHEE-	RIOUS FOREST REPORT CHATTAHOOCHEE-OCONEE NATIONAL POREST, REG PAPER NO. 682 FOREST REPORT	1986 REGION 8	× ×				B, C, B/C
VERRY, ELON S. ASPEN CLEARCUT WATER RESOURCE PAPER NO. 509	ET AL ITING INCREASES SNOWMELT ES BULLETIN 19(1):59-67 LOGGING SYSTEM	1983 & STORM FLOW PEAKS IN N. CENTRAL ASPEN	RAL MN X X				•
WORLEY, DAVID P. ECONOMIC EVALU WATER RESOURCE PAPER NO. 435	RLEY, DAVID P. ECONOMIC EVALUATION OF SOME WATERSHED MG WATER RESOURCES RESEARCH 7(4):812-818 PAPER NO. 435 VEGETATIVE MGMT	RLEY, DAVID P. PATRIC, JAMES H. 1971 ECONOMIC EVALUATION OF SOME WATERSHED MGMT ALTERNATIVES ON FOREST LAND IN WATER RESOURCES RESEARCH 7(4):812-818 PAPER NO. 435 VEGETATIVE MGMT FORESTED	LAND IN WV		×		oʻ.

				CONVERSION COST OR	COST OR	SAVINGS	
CITATION	PRACTICE	RANGE TYPE	WQ WY WT	RELATIONS	VALUE	INCREMENT	ECONOMICS
							1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
YOHO, NOEL S.		UNKWN					
FOREST MANAGEMENT	FOREST MANAGEMENT AND SEDIMENT PRODUCTION IN THE SOUTH - A REVIEW	THE SOUTH - A REVIEW					
SOUTHERN JOURNAL	SOUTHERN JOURNAL OF APPLIED PORESTRY:27-35						
PAPER NO. 457	LOGGING SYSTEM	FORESTED	, , ×	r		×	٠.

CITATION	PRACTICE	RANGE TYPE	W W WT	CONVERSION	COST OR	SAVINGS INCREMENT	ECONOMICS
BAKER, MALCHUS B., JR. HYDROLOGIC REGIMES O AM SOC CIVIL ENGINEE PAPER NO. 487	P THREE VEGETATI RS PROC: HYDRO & EGETATIVE MGMT	KER, MALCHUS B., JR.  HYDROLOGIC REGIMES OF THREE VEGETATION TYPES ACROSS THE MOGOLLON RIM  AM SOC CIVIL ENGINEERS PROC: HYDRO & WATER RES IN AZ & SW. VOL. 11:5-12  PAPER NO. 487 VEGETATIVE MGMT PNYN-JNPR & PONDRSA	-12 - x -	,	,	,	';
BLOSSER, RUSSELL O. FORESTRY MANAGEME NATL COUNCIL OF P PAPER NO. 427	OSSER, RUSSELL O. FORESTRY MANAGEMENT PRACTICES & CUMULAT NATL COUNCIL OP PAPER INDUSTRY FOR AIR PAPER NO. 427 GENERAL PAPER	OSSER, RUSSELL O. FORESTRY MANAGEMENT PRACTICES & CUMULATIVE EFFECTS ON WATER QUALITY & UTILITY NATL COUNCIL OF PAPER INDUSTRY FOR AIR & STREAM IMPROV, INC, TECH BULLETIN 43 PAPER NO. 427 GENERAL PAPER	& UTILITY ULETIN 435 X X -	,	÷ ,		,
BRNA, PAUL POREST MANAGEME USDI, BUREAU OP PAPER NO. 735	na, Paul Forest management benefits valuation, a bibliography USDI, bureau of land management, technical note 302 Paper no. 735 economic analysis	1977 BIBLIOGRAPHY CAL NOTE 302	,			,	æ
BROZKA, ROBERT J. EFFECTS OF TIMB NEW MEXICO SOIL PAPER NO. 550	ER HARVESTING & ASSOC & WATER CONSERVATION MULTIPLE	1982 ROADS ON WATER QUALITY & MGMT PRACTICES DIVISION, CONTRACT 70-541-60, EXHIBIT B X - X	RACTICES EXHIBIT B X	×	×	×	o, e
CHAKRAVARTY, SHRI M. K. ECONOMICS OF WATERSHE JOURNAL OF SOIL AND W PAPER NO. 442 GE	AKRAVARTY, SHRI M. K. ECONOMICS OF WATERSHED MANAGEMENT JOURNAL OF SOIL AND WATER CONSERVATION IN INDIA 28(1-4):69-75 PAPER NO. 442 GENERAL PAPER WATERSHED	1978 IN INDIA 28(1-4):69-75 WATERSHED		,	,		B, C, IRR

CITATION	PRACTICE	RANGE TYPE	TW YW OW	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
CHAKRAVARTY, SHRI M. K. ECONOMICS OF WATERSHED MANAGEMENT JOURNAL OF SOIL AND WATER CONSERV PAPER NO. 736 ECONOMIC ANALY	D MANAGEMENT ATER CONSERVAT ONOMIC ANALYSI:	1978 ION IN INDIA 28(1-4):69-75 S	, ,	,	,	,	. ':
DESVOUSGES, WILLIAM H. TYPE B TECHNICAL INP RESEARCH TRIANGLE IN PAPER NO. 745	SVOUSGES, WILLIAM H. SKAHEN, VENETIA A. TYPE B TECHNICAL INFORMATION DOCUMENT: TECHNIC RESEARCH TRIANGLE INSTITUTE PROJECT 3142-05DR PAPER NO. 745 ECONOMIC ANALYSIS	SVOUSGES, WILLIAM H. SKAHEN, VENETIA A. 1985 TYPE B TECHNICAL INPORMATION DOCUMENT: TECHNIQUES TO MEASURE DAMAGES TO NATURA RESEARCH TRIANGLE INSTITUTE PROJECT 3142-05DR PAPER NO. 745 ECONOMIC ANALYSIS	TO NATURA		,	,	
DYRLAND, R. D. PRACTICAL LINKAGE USPS REGION 5 PAPER NO. 738	RLAND, R. D. PRACTICAL LINKAGE OP ECONOMICS WITH HYDROI USPS REGION 5 PAPER NO. 738 ECONOMIC ANALYSIS	UNKWN HYDROLOGIC DATA & INTERPRETATIONS FOR	S FOR USE		,		,
GRAY, S. L. VALUATION OF WATER ON WILDLANDS VALUATION OF WLDLND RESOURCE BEI PAPER NO. 436 GENERAL PAPEI	R. A.	1984 S. WESTVIEW PRESS BOULDER, CO, 1984:157-91 WILDLAND X X X	984:157-91 X X X			,	B, C
GREGERSEN, H. M. GUIDELINES FOR EC PREPARED FOR THE PAPER NO. 730	EGERSEN, H. M. GUIDELINES FOR ECONOMIC APPRAISAL OF WATEF PREPARED FOR THE FOOD AND AGRICULTURE ORGA PAPER NO. 730 GENERAL WATERSHED MGMT	EGERSEN, H. M.  GUIDELINES FOR ECONOMIC APPRAISAL OF WATERSHED MANAGEMENT PROJECTS PREPARED FOR THE FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS PAPER NO. 730 GENERAL WATERSHED MGMT	SNOI			,	B,C,B/C

CITATION	PRACTICE	RANGE TYPE	TW YW DW	CONVERSION	COST OR	SAVINGS INCREMENT	ECONOMICS
HARR, R. DENNIS POTENTIAL FOR A WATER RESOURCE PAPER NO. 499	RR, R. DENNIS POTENTIAL FOR AUGMENTING WATER YIELD THROUGH WATER RESOURCES BULLETIN 19(3):383-393 PAPER NO. 499	1983 THROUGH FOREST PRACTICES IN W.	WA/W. OR	,		,	
LUSBY, GREGG C.		1970					
HYDROLOGIC & B JOURNAL OF RAN PAPER NO. 416	HYDROLOGIC & BIOTIC EPPECTS OF GRAZING VS. I JOURNAL OF RANGE MANAGEMENT 3:256-260 PAPER NO. 416 GRAZING SYSTEM	NON-GRAZING NEAR GRAND JUNCTION, CO	X X x	,			
MCDONALD, ROBERT SILVICULTURAL ACTIVITII USFS, EPA-600/8-77-018	ET AL ACTIVITIES & NON-POINT 8-77-018	1977 POLLUTION ABATEMENT: COST-EPFECTIVENESS	CTIVENESS				
PAPER NO. 742	ECONOMIC ANALYSIS	•	· ·		•	•	U
MEYER, G. J. SEDIMENT YIELD: JOURNAL OF SOI! PAPER NO. 545	YER, G. J.  SEDIMENT YIELDS FROM ROADSIDES: APPLICATION OF UNIVERSAL SOIL LOSS EQUATION JOURNAL OF SOIL AND WATER CONSERVATION (NOV-DEC 1985):289-292 PAPER NO. 545 ROADS T	1975 ICATION OF UNIVERSAL SOIL LOSS E ON (NOV-DEC 1985):289-292	SQUATION X - X	ı		,	
PETERSON, GEORGE VALUATION OF W WESTVIEW PRESS	VALUATION OF WILDLAND RESOURCE BENEFITS WESTVIEW PRESS, INC., BOULDER, COLORADO 1984	1984	,	,	,	,	٥
PAPER NO. 733	ECONOMIC ANALYSIS						B, C, B/C, 1KK

CITATION	PRACTICE RANGE TYPE	TYPE	W W WT	CONVERSION	COST OR	SAVINGS	ECONOMICS
SILVEY, LEE "HYSED" A WATER	LVEY, LEE 1980  "HYSED" A WATER RESOURCE ANALYSIS MODEL FOR FOREST LAND USE PLANNING	1980 LAND USE PLANNING	1 1 1 1 1 1 1 1 1		; 1 6 1 1 1 1 1	, 1 1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1 1
PAPER NO. 732	GENERAL WATERSHED MGMT		t t	·		•	· :
STONE, EARL THE IMPACT OF T USFS REPORT OF PAPER NO. 497	ONE, EARL THE IMPACT OF TIMBER HARVEST ON SOILS AND WATER USFS REPORT OF THE PRESIDENT'S ADVISORY ON TIMBER PAPER NO. 497 LOGGING SYSTEM	1977 & THE ENVIRONMENT, APR 1973 X X X	APR 1973 X X X	•			v
USDA SOIL CONS SERVICE ECONOMICS GUIDE POR WATERSHED USDA SOIL CONSERVATION SERVICE PAPER NO. 744 ECONOMIC AN	DA SOIL CONS SERVICE ECONOMICS GUIDE POR WATERSHED PROTECTION AND PLOOD PREVENTION USDA SOIL CONSERVATION SERVICE PAPER NO. 744 ECONOMIC ANALYSIS	1964 PREVENTION			,		B, C
USFS 1985 RPA - WATER BENEPIT VALU COPIES AVAILABLE UPON REQUEST PAPER NO. 451 MULTIPLE	ips 1985 rpa - water benefit values and procedures copies available upon request paper no. 451 multiple	1983	, , *	,	1		D.
WELLS, CAROL G. EFFECTS OF PIRE USFS WO-7 GENER PAPER NO. 729	LLS, CAROL G. ET AL EFFECTS OP PIRE ON SOIL, A STATE-OP-KNOWLEDGE REVIEW USFS WO-7 GENERAL TECHNICAL REPORT PAPER NO. 729 GENERAL WATERSHED MGMT -	1978 w	:	,			

CITATION	PRACTICE	RANGE TYPE	TW YW DW	CONVERSION	COST OR	SAVINGS	ECONOMICS
WILLIAMS, THOMAS M. WATER QUALITY CHA	ASKEW, GEORGE NGES ASSOCIATED WITH	R. 1984 FOREST DRAINAGE & PINE PLANTATION ESTAB	!				
USFS SO-54 GTR,	USFS SO-54 GTR, 3RD BIENNIAL SOUTHERN SILVIC	SILVICULTURAL RESEARCH CONF PROC:536-549	00:536-549				
PAPER NO. 466	VEGETATIVE MGMT	FORESTED	, ,	ŧ		•	· .
WOOD, M. KARL	BLACKBURN, WILBERT H.	. 1981					
GRAZING SYSTEMS:	GRAZING SYSTEMS: THEIR INFLUENCE ON INPILTRATION RATES IN ROLLING PLAINS OP TX	TION RATES IN ROLLING PLA	AINS OF TX				
JOURNAL OF RANGE	JOURNAL OF RANGE MANAGEMENT 34(4):331-335						
PAPER NO. 418	GRAZING SYSTEM	•	, ×				



CITATIONS FOR FISHERIES MODEL



## PISHERIES MODEL - CITATIONS FOR ANADROMOUS SPECIES

CITATION	PRACTICE	RANGE TYPE	WQ WY WT FH	EM CC BM	NUMBERS/ POUNDS	INCREMENT	CONVERT	NO ON O
BROWN, WILLIAM G. MEASUR RECREATICOMMITTEE ON ECC	MEASUR RECREATION BENEFIT PROM NATURAL RES-PARTICULAR REFER TO COMMITTEE ON ECON OF RNG USE & DEVELOP OF W AGRIC ECON RESEARCH PAPER NO. 645 INSTREAM PLOW NEEDS RIVER	1964  RES-PARTICULAR REFER TO SALMON  OP W AGRIC ECON RESEARCH COUNCIL  RIVER	TO SALMONOREGON	2			*	20 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
CHAMBERLIN, T. W. INFLU FOR/RNG MG USFS PNW-136 GEN PAPER NO. 569	AMBERLIN, T. W. INFLU FOR/RNG MGT ON ANADRO PISH HABITAT WEST USFS PNW-136 GENERAL TECHNICAL REPORT PAPER NO. 569 LOGGING SYSTEM STREAM	z	1982 AMERICA: TIMBER HARVEST X X X X	ပ <u></u>	r	,		,
CLAIRE, ERROL W. STREAMSIDE MGMT WORKSHOP: LIVEST PAPER NO. 626	AIRE, ERROL W. STREAMSIDE MGMT & LIVESTOCK GRAZING IN BLWORKSHOP: LIVESTOCK/WILDLIFE-PISH RELATICPAPER NO. 626 RANGE MANAGEMENT	1977 .UE MOUNTAINS OF .NSHIPS IN GREAT	OREGON: A CASE STUDY BASIN PROC:111-128			,		
CLARK, ROGER N. INFLU POR/RNG MGT USFS PNW-178 GENE PAPER NO. 574	ET AL INFLU FOR/RNG MGT ON ANADRO PISH HABITAT WEST USFS PNW-178 GENERAL TECHNICAL REPORT PAPER NO. 574 RECREATION	1985 N. AMERICA: .AN & AQUATIC	INFLU OF RECREATION  X X	·	,	,	,	
DUNCAN, S. H. INFLUENCE WATERSHED GEOLOGY/FOR NORTHWEST SCIENCE 59(3):204-212 PAPER NO. 624 ROADS	. W. EST ROADS	1985 ON COMPOSITION SALMON STREAM	SPAWNING GROUND X ~ X	•	,	,	,	

CITATION PRACTICE	GE.	RANGE TYPE	WQ WY WT FH	EM CC BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
EVEREST, FRED H.  HARR, R. DENNIS INFLU FOR/RNG MCT ON ANADRO FISH HABITAT WEST USFS PNW-134 GENERAL TECHNICAL REPORT PAPER NO. 571 MULTIPLE	HARR, R. DENNIS IDRO FISH HABITAT HNICAL REPORT	1982 N. AMERICA:	SILVIC TREATMENTS X X X X X	υ ω	,			4
GIBBONS, DAVE R. AN ANNOTATED BIBLIOGRAPHY OF EFPECTS USFS PNW-10 GENERAL TECHNICAL REPORT PAPER NO. 567 MULTIPLE		O. 1973 OF LOGGING ON FISH OF STREAM	1973 FISH OF WESTERN US & CANADA X - X	e u	×	×	•	ı
GILLICK, THOMAS BUFFER STRIPS AND THE PROTECTION OF F STATE OF WASHINGTON, DEPT OF NATURAL PAPER NO. 580 LOGGING SYSTEM	SCOTT, BILLY DEAN OTECTION OF FISHE OT OF NATURAL RESO SYSTEM	FISHERY RESOURCES: AN ECONOMIC ANALYSIS L RESOURCES, DNR REPORT 32 STREAM	32 x - x		×	×		В, С, В/С
GOVER, W. C. MANAGEMENT NOTES - MY RANGE USE AFFECTS S/ JOURNAL OF RANGE MANAGEMENT 20(4):263-265 PAPER NO. 642 RANGE MANAGEMENT S'	SE USE AFFECTS NT 20(4):263-2 NAGEMENT	ALMON AND TREAM	1967 STEELHEAD PRODUCTION		ı	×	×	B, C
BAKER, CALVIN O. INFLU FOR/RNG MGT ON ANADRO FISH HABITAT WEST USFS PNW-138 GENERAL TECHNICAL REPORT PAPER NO. 575 STREAM IMPROVEMENT STREAM	BAKER, CALVIN O. ON ANADRO FISH HABITAT RAL TECHNICAL REPORT STREAM IMPROVEMENT	z	1982 AMER: REHAB STKM HABITAT-PT X X X -	E				ı

CITATION	PRACTICE	RANGE TYPE	WQ WY WT FH	EM CC BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
HELLER, DAVID A. MODELING THE EFI USFS PNW, SIUSL, PAPER NO. 615	LLER, DAVID A.  MODELING THE EFFECTS OF POREST MANAGEMENT ON USFS PNW, SIUSLAW NATIONAL POREST PAPER NO. 615 MULTIPLE	1983 MENT ON SALMONID HABITAT	× , ,		,	,		æ
HIAWATHA NATIONAL FOREST FOREST REPORT USFS REGION 9 PAPER NO. 687 PORES	FOREST POREST REPORT	-			×	×		В.С.В/С
HUPPERT, DANIEL D. INFLU POR/RNG MG' USPS PNW-181 GENI PAPER NO. 577	PPERT, DANIEL D. ET AL INFLU POR/RNG MGT ON ANADRO FISH HABITAT WEST USPS PNW-181 GENERAL TECHNICAL REPORT PAPER NO. 577 MULTIPLE	. z z e	1985 AMER: ECONOMIC CONSIDERATIONS & AQUATIC	Ø	×	. ×	,	B.C,B/C
MIH, WALTER C. A MACHINE FOR MI USFS RM-65 GENEI PAPER NO. 579	H, WALTER C. A MACHINE FOR MITIGATION OP SALMONID USFS RM-65 GENERAL TECHNICAL REPORT:6PAPER NO. 579 STREAM IMPROVEMENT	C. 1979 SPAWNING HABITAT FROM SILTING 645-648 STREAM X	X X	ப			•	
NORRIS, L. A. INPLU FOR/RNG MC USFS PNW-149 GER PAPER NO. 573	ET AL INPLU FOR/RNG MGT ON ANADRO PISH HABITAT WEST USFS PNW-149 GENERAL TECHNICAL REPORT PAPER NO. 573 MULTIPLE	1983 TAT WEST N. AMERICA: FOREST CHEMICALS STREAM X X X	ST CHEMICALS X - X					

				0		0	
CITATION PRACTICE	RANGE TYPE	WQ WY WT FH E	ЕМ СС ВМ	NUMBERS/ POUNDS	INCREMENT	TO WFUD	ECONOMICS
PLATTS, WILLIAM S. INFLU FOR/RNG MGT ON ANADRO PISH HABITAT WEST N	1981 IABITAT WEST N AMER: EFFECT	1981 AMER: EFFECT LIVESTOCK GRAZING	; 1 1 1 1 1 1 1		1 6 6 1 1 1 1 1	1 1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1 1 1 1
USFS FNW-124 GENERAL IECHNICAL REFORT PAPER NO. 572 RANGE MANAGEMENT	STREAM	, × ×		,	×		1.
REEVES, GORDON H. ROELOFS, TERRY D. INFLU FOR/RNG MGT ON ANADRO PISH HABITAT WEST USFS PNW-140 GENERAL TECHNICAL REPORT	z	1982 AMER: REHAB STRM HABITAT-PT 2					
PAPER NO. 576 STREAM IMPROVEMENT	VT STREAM	× , , , , , , , , , , , , , , , , , , ,		ı	ı	i	ı
REID, LESLIE M. SEDIMENT PRODUCTION FROM FOREST ROAD SURF WATER RESOURCES RESEARCH 20(11):1753-1761	DMAS DAD SURFACES 753-1761						
PAPER NO. 623 ROADS	STREAM	×		ŧ	ł	ŧ	1
REISER, D. W. BJORNN, T. C. INFLU FOR/RNG MGT ON ANADRO FISH HABITAT WEST USFS PNW-96 GENERAL TECHNICAL REPORT	ż	1979 AMERICA: HABITAT REQUIREMENTS					
PAPER NO. 568 MULTIPLE	STREAM	× × ×	ပ	1	ŧ	ŧ	
ROBISON, M. HENRY HORMAECHEA, DANIEL T. POTENTIAL EMPLOYMENT IMPACT OF ANADROMOUS FISH		1986 HABITAT MGT ON PAYETTE NATL FOR					
DAPER NO. 566 MULTIPLE RIVERSI, MCCALL, IDANO	all, idano River	× ,		,	ŧ	×	в,

## PISHERIES MODEL - CITATIONS FOR ANADROMOUS SPECIES

TION	PRACTICE	RANGE TYPE	WQ WY WT FH	EM CC BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
SEDELL, JAMES R. INPLU FOR/RNG M. USFS PNW-186 GE! PAPER NO. 570	DELL, JAMES R. DUVAL, WAYNE S. INPLU FOR/RNG MGT ON ANADRO PISH HABITA USFS PNW-186 GENERAL TECHNICAL REPORT PAPER NO. 570 LOGGING SYSTEM	DELL, JAMES R.  DUVAL, WAYNE S.  INPLU FOR/RNG MGT ON ANADRO PISH HABITAT WEST N AM-WATER TRANSPRT/STORAGE LOGS USFS PNW-186 GENERAL TECHNICAL REPORT PAPER NO. 570  LOGGING SYSTEM  TABLES NO. 570	T/STORAGE LOG	ς, ω				
STOWELL, RICK GUIDE FOR PREDIO USFS NORTHERN R PAPER NO. 583	OWELL, RICK GUIDE FOR PREDICT SALMONID RESPONSE TO USFS NORTHERN REGION AND INTERMOUNTAIN PAPER NO. 583 GENERAL	1983 SEDIMENT YLD IN ID BATHOLITH WATERSHEDS REGION, WILDLIFE MANAGEMENT STREAM X - X	.ITH WATERSHED .NT X X	s a	×			ı
WARNER, ANNE L. EQUITY OP DISTR AM FISHERIES SO PAPER NO. 578	RNER, ANNE L. EQUITY OP DISTRIB OP COSTS & BENEFITS II AM FISHERIES SOCIETY, SYMPOSIUM ON SMAL. PAPER NO. 578 STREAM IMPROVEMENT	HNER, ANNE L. EQUITY OP DISTRIB OP COSTS & BENEFITS IN NEW ENGLAND ANADROMOUS FISH PROGRAM AM FISHERIES SOCIETY, SYMPOSIUM ON SMALL HYDROPOWER AND FISHERIES PROC:127-132 PAPER NO. 578 STREAM IMPROVEMENT RIVER	FISH PROGRAM S PROC:127-13	ę,	ı		×	В, С



ECONOMICS					
	:	t	1	•	1
CONVERT TO WFUD	×				
INCREMENT	,				
NUMBERS/ POUNDS	,		,		
EM CC BM			S		
WT FH		*	SALMONIDS	FOREST X	×
M AM OM	LDELINES	, ,	В Х	TTE NAT'L F	×
RANGE TYPE	1982 AND FISH-KILL COUNTING GUIDELINES PUBLICATION 13 STREAM	MES T. TEMPERATURE 1139 STREAM	1985 : WOODY DEBRIS, AND IT 29-334 RIPARIAN	HARD E. 1985 SELECTED STREAMS ON PAYETTE NAT'L STREAM X ^	1986 AT IMPROVEMENT MANAGEMENT STAFF STREAM
PRACTICE	RESHWATER PISH OCIETY, SPECIAL ERAL	OWN, GEORGE W.  EFFECTS OP CLEAR-CUTTING ON STREAM TEMPE WATER RESOURCES RESEARCH 6(4):1133-1139 PAPER NO. 556 LOGGING SYSTEM	1985 CHANGES 30 YEARS APTER LOGGING IN LARGE WOODY DEBRIS, AND ITS USE USFS RM-120 GENERAL TECHNICAL REPORT:329-334 PAPER NO. 557 LOGGING SYSTEM RIPARIAN X	RNS, DAVID C. EMBEDDEDNESS OF SALMONID HABITAT OP SELECTE PAYETTE NATIONAL FOREST, DRAPT PAPER NO. 614 STR	FF, DONALD A. INDEXED BIBLIOGRAPHY ON STREAM HABITAT IMPROVEMENT USFS INTERMOUNTAIN REGION, WILDLIFE MANAGEMENT STA PAPER NO. 608 STREAM IMPROVEMENT STREAM
CITATION	AMERICAN FISHERIES SOC MONETARY VALUES OP PI AMERICAN FISHERIES SI PAPER NO. 646 GEN	BROWN, GEORGE W. EFFECTS OP CLEA WATER RESOURCES PAPER NO. 556	BRYANT, MASON D. CHANGES 30 YEAR USFS RM-120 GEN PAPER NO. 557	BURNS, DAVID C. EMBEDDEDNESS OF PAYETTE NATIONA PAPER NO. 614	DUFF, DONALD A. INDEXED BIBLIOG USFS INTERMOUNT PAPER NO. 608

CITATION	PRACTICE	RANGE TYPE	WQ WY WT PH	ЕМ СС ВМ	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WPUD	ECONOMICS
ESTES, CHRISTOPHER C. REVIEW & ANALYSIS O WATER RESOURCES BUL PAPER NO. 562 IN	TES, CHRISTOPHER C. ORSBORN, JOHN F. REVIEW & ANALYSIS OF METHODS FOR QUANTIF WATER RESOURCES BULLETIN 22(3):389-398 PAPER NO. 562 INSTREAM FLOW NEEDS	TES, CHRISTOPHER C. ORSBORN, JOHN F. 1986 REVIEW & ANALYSIS OF METHODS FOR QUANTIFYING INSTREAM FLOW REQUIREMENTS WATER RESOURCES BULLETIN 22(3):389-398 PAPER NO. 562 INSTREAM FLOW NEEDS STREAM	REQUIREMENTS	<u>ය</u>		,		
FAUSCH, KURT D. MODELS THAT PR UNPUBLISHED PAPER NO. 613	USCH, KURT D. PARSONS, MIT MODELS THAT PREDICT STANDING CROP OF UNPUBLISHED PAPER NO. 613 GENERAL PAPER	G. STREAM PISH	1985 FROM HABITAT VARIABLES	æ			ı	ı
KONDOLF, G. MATHIAS APPLICATION OF HI: AM FISHERIES SOCII PAPER NO. 564	NDOLF, G. MATHIAS SALE, MICHAEL J. APPLICATION OF HISTORICAL CHANNEL STABII AM FISHERIES SOCIETY, SYMPOSIUM ON SMALI PAPER NO. 564 INSTREAM PLOW NEEDS	1985 STABILITY ANALYSIS TO SMALL HYDROPOWER AND DS RIVER	INSTREAM FLOW STUDIES FISHERIES PROC:184-19 X - x	4	,	,	·	,
MEYER, P. CALCULATION OF BONNEVILLE POW PAPER NO. 753	ET AL F ENVIRON COSTS/BENE VER ADMIN, OFFICE OI MULTIPLE	YER, P.  CALCULATION OF ENVIRON COSTS/BENEPITS ASSOCIATED WITH HYDROPOWER DEVEL IN PNW BONNEVILLE POWER ADMIN, OFFICE OF ENVIRONMENTAL ANALYSIS, PORTLAND, OREGON PAPER NO. 753 MULTIPLE	POWER DEVEL IN PNW ORTLAND, OREGON X X X X					
MILNER, ALEXANDER M. INFLUENCE OF WATER AM FISHERIES SOCIE PAPER NO. 581	LNER, ALEXANDER M. ET AL INFLUENCE OF WATER TEMP & STREAMFL AM FISHERIES SOCIETY, SYMPOSIUM ON PAPER NO. 581 GENERAL	LNER, ALEXANDER M. ET AL INFLUENCE OF WATER TEMP & STREAMFLOW ON SOCKEYE SALMON FRY EMERGENCE/MIGRATION AM FISHERIES SOCIETY, SYMPOSIUM ON SMALL HYDROPOWER AND PISHERIES PROC:54-58 PAPER NO. 581 GENERAL	EMERGENCE/MIGRATIO HERIES PROC:54-58	z. w			,	,

CITATION	PRACTICE	RANGE TYPE	WQ WY WT FH	EM CC BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
NELSON, W. ASSESSMENT OF E US DEPT OF INTE	SLSON, W.  ASSESSMENT OF EFFECTS OF ALTERED STREAN US DEPT OF INTERIOR, FISH & WILDLIFE SE PAPER NO. 558 INSTREAM FLOW NEEDS	LSON, W.  ASSESSMENT OF EFFECTS OF ALTERED STREAM FLOW CHARACTERISTIC ON FISH & WILDLIFE US DEPT OF INTERIOR, PISH & WILDLIFE SERVICE, FWS/OBS-76/30  PAPER NO. 558 INSTREAM PLOW NEEDS STREAM	ISH & WILDLIF	e e	,		:	
PLATTS, WILLIAM S. METHODS FOR EVAL USFS INT-138 GEN PAPER NO. 601	ATTS, WILLIAM S. ET AL METHODS FOR EVALUATING STREAM, RIPARIAN USFS INT-138 GENERAL TECHNICAL REPORT PAPER NO. 601 GENERAL	ATTS, WILLIAM S. ET AL METHODS FOR EVALUATING STREAM, RIPARIAN, AND BIOTIC CONDITIONS USFS INT-138 GENERAL TECHNICAL REPORT PAPER NO. 601 GENERAL	× ' '		×			
SHERIDAN, W. L. BENEPIT/COST: SALMUUSFS ALASKA REGION PAPER NO. 582 S'	ERIDAN, W. L. BENEFIT/COST: SALMON HABITAT IMPROVEMENT USFS ALASKA REGION PAPER NO. 582 STREAM IMPROVEMENT	1969 IT STREAM	•		×	×		В, С, В/С
SORG, CINDY F.  NET ECONOMIC VALUE OF COLD AN USFS RM-11 RESOURCE BULLETIN PAPER NO. 647 INSTREAM FLC	L ND WARM OW NEEDS	1985 WATER FISHING IN IDAHO						<u>.</u> 9



CITATION	PRACTICE	RANGE TYPE	W WY WT PH	EM CC BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
AMERICAN FISHERIES SOC MONETARY VALUES OF F AMERICAN FISHERIES S PAPER NO. 646 GEN	IERICAN FISHERIES SOC MONETARY VALUES OF FRESHWATER FISH AND FISH-KILL C AMERICAN FISHERIES SOCIETY, SPECIAL PUBLICATION 13 PAPER NO. 646 GENERAL STREAM	IBRICAN FISHERIES SOC MONETARY VALUES OF PRESHWATER FISH AND FISH-KILL COUNTING GUIDELINES AMERICAN FISHERIES SOCIETY, SPECIAL PUBLICATION 13 PAPER NO. 646 GENERAL STREAM	NESS ,		·		×	æ
ANDERSON, RICHARD M. IMPACTS OF STREAM AM FISHERIES SOCIE PAPER NO. 592 I	NEHRING, R. B DISCHARGE ON TROUT TY, SYMPOSIUM ON SM NSTREAM FLOW NEEDS	DERSON, RICHARD M. NEHRING, R. BARRY 1985 IMPACTS OF STREAM DISCHARGE ON TROUT REARING HABITAT/TROUT RECRUITMENT INCO AM FISHERIES SOCIETY, SYMPOSIUM ON SMALL HYDROPOWER AND FISHERIES PROC:59-64 PAPER NO. 592 INSTREAM FLOW NEEDS STREAM	S	. ш		•		
BABCOCK, WILLIAM H. TENMILE CREEK: A WATER RESOURCES E PAPER NO. 612	BCOCK, WILLIAM H. TENMILE CREEK: A STUDY OF STREAM RELOCATION WATER RESOURCES BULLETIN 22(3):405-415 PAPER NO. 612 STREAM RELOCATION STR	1986 STREAM	× × ×		- *	×	,	
BACON, EDMOND J. THE EFFECTS OF ARKANSAS WATER PAPER NO. 552	CON, EDMOND J. THE EPFECTS OF FOREST HARVEST ON WATER ARKANSAS WATER RESOURCES RESEARCH CTR, PAPER NO. 552 LOGGING SYSTEM	1983 QUALITY AND AQUATIC LIFE (PHASE I) , UNIV OF AR, FAYETTEVILLE, AR, A-05 STREAM	(PHASE I) , AR, A-052-ARK X X		×			
BEHNKE, ROBERT J. IMPACT OF LIVES WORKSHOP: LIVES PAPER NO. 628	HNKE, ROBERT J. IMPACT OF LIVESTOCK GRAZING ON STREAM WORKSHOP: LIVESTOCK/WILDLIFE-FISH RELA PAPER NO. 628 RANGE MANAGEMENT	HNKE, ROBERT J. IMPACT OF LIVESTOCK GRAZING ON STREAM PISHERIES: PROBLEMS AND SOLUTIONS WORKSHOP: LIVESTOCK/WILDLIFE-FISH RELATIONSHIPS IN GREAT BASIN PROC:170-173 PAPER NO. 628 RANGE MANAGEMENT RIPARIAN	OLUTIONS PROC:170-173	<b>a</b>	×			В, С

CITATION	PRACTICE	RANGE TYPE	WQ WY WT FH	EM CC BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
BINNS, N. ALLEN EVALUATION OF 1 USFS RM-65 GEN PAPER NO. 595	NNS, N. ALLEN EISERMAN, FRED M. EVALUATION OF PLUVIAL TROUT HABITAT IN ROCK USFS RM-65 GENERAL TECHNICAL REPORT:361-364 PAPER NO. 595 GENERAL STR	ED M. 1979 IN ROCKY MOUNTAIN STREAMS 361-364 STREAM	*		,			
BINNS, N. ALLEN HABITAT, MACROJ PA FISH COMMISS PAPER NO. 585	1986 HABITAT, MACROINVERT & PISHERY RESPONSE TO STREAM IMPROVEMENT EFFORTSIN WY PA FISH COMMISSION, 5TH TROUT STREAM HABITAT IMPROVEMENT WORKSHOP PROC:105-11 PAPER NO. 585 STREAM IMPROVEMENT STREAM	1986  WY  HABITAT IMPROVEMENT WORKSHOP PROC:105-116  STREAM  X	FFORTSIN WY OP PROC:105-11 X - X	9 <sup>3</sup>	×	×	,	
BOUSSU, MARVIN F. RELATIONSHIP BE JOURNAL OF WILD PAPER NO. 598	TWEEN TROUT POPULATIO LIPE MANAGEMENT 18(2) -	1954 NS AND COVER ON A SMALL STRI :229-239 STREAM	EA M X		×	×		
BURNS, DAVID C. EMBEDDEDNESS OI PAYETTE NATION/ PAPER NO. 614	RNS, DAVID C. EMBEDDEDNESS OF SALMONID HABITAT OF SELECTE PAYETTE NATIONAL FOREST, DRAPT PAPER NO. 614 - STR	HARD E. 1985 SELECTED STREAMS ON PAYETTE NAT'L FOREST STREAM X ~ X	NAT'L FOREST			,	,	,
CAMPBELL, RONALD F. SEASONAL/DIURNAL AM PISHERIES SOCI	SEASONAL/DIURNAL SHIFTS IN HABITAT UTILIZED BY RESIDENT HAINBOW TROUT IN W. ' AM PISHERIES SOCIETY, SYMPOSIUM ON SMALL HYDROPOWER AND FISHERIES PROC:39-49 PAPER NO. 590 INSTREAM FLOW NEEDS STREAM	H. IZED BY RESIDENT KAINBOW L HYDROPOWER AND FISHEKIE STREAM	TROUT IN W. WA ES PROC:39-49	<b>«</b>	×			,

CITATION	PRACTICE	RANGE TYPE	WQ WY WT FH	EM CC BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
CLAIRE, ERROL W. STREAMSIDE MGMT WORKSHOP: LIVEST	AIRE, ERROL W. STORCH, ROBERT STREAMSIDE MGMT & LIVESTOCK GRAZING IN WORKSHOP: LIVESTOCK/WILDLIFE-FISH RELA PAPER NO. 626 RANGE MANAGEMENT	T L. 1977  N BLUE MOUNTAINS OF OREGON: A CASE STU ATIONSHIPS IN GREAT BASIN PROC:1111-128 RIPARIAN	ON: A CASE STUDY N PROC:1111-128			,	,	
DAHLEM, EUGENE A. THE MAHOGANY CRE FORUM - GRAZING PAPER NO. 588	HLEM, EUGENE A. THE MAHOGANY CREEK WATERSHED - WITH AN FORUM - GRAZING & RIPARIAN/STREAM ECOS PAPER NO. 588 RANGE MANAGEMENT	1978 THE MAHOGANY CREEK WATERSHED - WITH AND WITHOUT GRAZING FORUM - GRAZING & RIPARIAN/STREAM ECOSYSTEMS PROC, TROUT UNLIMITED (PUB):31-34 PAPER NO. 588 RANGE MANAGEMENT RIPARIAN X - ' X	MITED (PUB):31-3 X - ' X	7		,	,	ı
DUFP, DONALD A. LIVESTOCK GRAZIN WORKSHOP: LIVEST PAPER NO. 637	LIVESTOCK GRAZING IMPACTS ON AQUATIC HABITAT IN WORKSHOP: LIVESTOCK/WILDLIFE-PISH RELATIONSHIPS PAPER NO. 637 RANGE MANAGEMENT STREAM	1977 HABITAT IN BIG CREEK, UTAH ATIONSHIPS IN GREAT BASIN STREAM	1977 BIG CREEK, UTAH IN GREAT BASIN PROC:129-142 X - X	<b></b>	×	ı		,
DUFF, DONALD A. RIPARIAN HABITAT FORUM - GRAZING PAPER NO. 630	F RECOVERY ON BIG CREE & RIPARIAN/STREAM ECO RANGE MANAGEMENT	1978 RIPARIAN HABITAT RECOVERY ON BIG CREEK, RICH COUNTY, UTAH - SUMMARY OF 8 YRS FORUM - GRAZING & RIPARIAN/STREAM ECOSYSTEMS PROC, TROUT UNLIMITED (PUB):91-92 PAPER NO. 630 RANGE MANAGEMENT RIPARIAN	UMMARY OF 8 YRS MITED (PUB):91-9	N		×	ı	r
DUFF, DONALD A. INDEXED BIBLIOGR USFS INTERMOUNTA PAPER NO. 608	FF, DONALD A. INDEXED BIBLIOGRAPHY ON STREAM HABITAT IMPROVE! USFS INTERMOUNTAIN REGION, WILDLIFE MANAGEMENT PAPER NO. 608 STREAM IMPROVEMENT STREAM	1986 T IMPROVEMENT ANAGEMENT STAFP STREAM	× , ,			•	ı	•

CITATION	PRACTICE	RANGE TYPE	WQ WY WT FH	EM CC BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
ESTES, CHRISTOPHER C. REVIEW & ANALYSIS O WATER RESOURCES BUL PAPER NO. 562 IN	TES, CHRISTOPHER C. ORSBORN, JOHN F. 1986 REVIEW & ANALYSIS OF METHODS FOR QUANTIFYING INSTREAM FLOW REQUIREMENTS WATER RESOURCES BULLETIN 22(3):389-398 PAPER NO. 562 INSTREAM FLOW NEEDS STREAM	F. IFYING INSTREAM FLOW REQU STREAM	JI REMENTS	வ	,		,	4:
FAUSCH, KURT D. MODELS THAT PR. UNPUBLISHED PAPER NO. 613	USCH, KURT D. MODELS THAT PREDICT STANDING CROP OF ST UNPUBLISHED PAPER NO. 613 GENERAL PAPER	G. STREAM FISH FROM HABITAT VARIABLES	ARIABLES X	<b>6</b> 0	,	1	r	•
FISHER, CARLA J. EFFECTS OP WAT EISENHOWER CON PAPER NO. 639	SHER, CARLA J. ZIEBELL, CHARLES D. 1980 EFFECTS OP WATERSHED USE ON WATER QUALITY & FISHERIES IN AN ARIZONA MTN LAKE EISENHOWER CONSORTIUM FOR WESTERN ENVIRONMENTAL FORESTRY RESEARCH, BULLETIN ' PAPER NO. 639 RANGE MANAGEMENT LAKE	ES D. 1980 ITY & FISHERIES IN AN ARI: RONMENTAL FORESTRY RESEAR LAKE	ZONA MTN LAKE ICH, BULLETIN 7 X ~ ~ X		,		•	ı
FISHLAKE NATIONAL FOREST FOREST REPORT USFS REGION 4 PAPER NO. 695 FORES	L FOREST FOREST REPORT	1987	, , ×		,	,	,	,
GLOVER, RONALD D. TROUT STREAM RE PA PISH COMMISS PAPER NO. 594	HABILITATION IN THE BI ION, 5TH TROUT STREAM STREAM IMPROVEMENT	1986 LACK HILLS OF SOUTH DAKOTA HABITAT IMPROVEMENT WORKSHOP PROC:7-15 STREAM X - x	OP PROC:7-15		×	×		

CITATION	PRACTICE	RANGE TYPE	WQ WY WT FH	EM CC BM	Pounds	INCREMENT	IO WFUD	ECONOMICS
HENRY, MICHAEL H. COMPARE RAINBOW AM FISHERIES SOC PAPER NO. 591	SARTO, GLEN DEL TROUT PISHERY IN RESPON CIETY, SYMPOSIUM ON SMAL INSTREAM PLOW NEEDS	NRY, MICHAEL H. SARTO, GLEN DEL 1985 COMPARE RAINBOW TROUT PISHERY IN RESPONSE TO REDUCED HIGH WNTR-SPRG STREAMFLOW AM FISHERIES SOCIETY, SYMPOSIUM ON SMALL HYDROPOWER AND FISHERIES PROC:65-73 PAPER NO. 591 INSTREAM PLOW NEEDS STREAM	R-SPRG STREAMFLOW RIES PROC:65-73		×			
HUBERT, WAYNE A. GRAZING MANAGEME USFS RM-120 GENE PAPER NO. 629	BERT, WAYNE A. GRAZING MANAGEMENT INPLUENCES ON TWO B. USFS RM-120 GENERAL TECHNICAL REPORT:2º PAPER NO. 629 RANGE MANAGEMENT	1985 BROOK TROUT STREAMS IN WYOMING: 290-294 STREAM	YOMING	æ	,			
HUNT, ROBERT L. EVAL OF BRUSH BU PA FISH COMMISSI PAPER NO. 593	NT, ROBERT L. EVAL OF BRUSH BUNDLES/HALF-LOGS TO ENH. PA FISH COMMISSION, 5TH TROUT STREAM H. PAPER NO. 593 STREAM IMPROVEMENT	NT, ROBERT L. EVAL OF BRUSH BUNDLES/HALP-LOGS TO ENHANCE CARRY CAPACITY OF 2 BRWN TROUT STRM PA FISH COMMISSION, 5TH TROUT STREAM HABITAT IMPROVEMENT WORKSHOP PROC:31-61 PAPER NO. 593 STREAM IMPROVEMENT STREAM	2 BRWN TROUT STRM SHOP PROC:31-61 X	g 'J	×	×	× .	B, C
HURON-MANISTEE NAT'L FORE FOREST REPORT USFS REGION 9 PAPER NO. 683 FOREST	T'L FORE FOREST REPORT	1985	× , ,		×	×	×	В, С
JOHNSON, R. ROY (ED) IMPORTANCE, PRESERI USFS RM-43 GENERAL PAPER NO. 731 G	JONES, DALE , VATION AND MANAGEMI TECHNICAL REPORT	A. (ED) 1977 IENT OP RIPARIAN HABITAT: A	A SYMPOSIUM			ı	,	ı

NUMBERS/ CONVERT PRACTICE RANGE TYPE WQ WY WT FH EM CC BM POUNDS INCREMENT TO WFUD ECONOMICS	LLER, CHARLES ET AL 1978 FISH HABITAT CHANGES IN SUMMIT CREEK, IDAHO, AFTER FENCING THE RIPARIAN AREA FORUM - GRAZING & RIPARIAN/STREAM ECOSYSTEMS PROC, TROUT UNLIMITED (PUB):46-52 PAPER NO. 633 RANGE MANAGEMENT RIPARIAN	ANALYSIS OF DESIGN FEATURES IN MITIGATING HIGHWAY CONSTRUCT IMPACTS ON STREAMS PA FISH COMMISSION, 5TH TROUT STREAM HABITAT IMPROVEMENT WORKSHOP PROC:221-232 PAPER NO. 619 ROADS B,C	NDOLF, G. MATHIAS SALE, MICHAEL J. 1985 APPLICATION OF HISTORICAL CHANNEL STABILITY ANALYSIS TO INSTREAM FLOW STUDIES AM FISHERIES SOCIETY, SYMPOSIUM ON SMALL HYDROPOWER AND FISHERIES PROC:184-194 PAPER NO. 564 INSTREAM FLOW NEEDS RIVER	NDGRAF, KENNETH G.  LONG TERM EFFECT OF GABION STRUCTURES ON STREAMBANK STABILIZ, NORTH RIVER, VA  PA FISH COMMISSION, 5TH TROUT STREAM HABITAT IMPROVEMENT WORKSHOP PROC:209-219  PAPER NO. 587 STREAM IMPROVEMENT STREAM  X - X
CITATION PE	KELLER, CHARLES FISH HABITAT CHANGE FORUM - GRAZING & I PAPER NO. 633 RA	KOBER, WAYNE W. ANALYSIS OF DESIGN FEATURES IN MITIG PA FISH COMMISSION, 5TH TROUT STREAM PAPER NO. 619 ROADS	KONDOLF, G. MATHIAS APPLICATION OF HIS AM FISHERIES SOCIE PAPER NO. 564 I	LANDGRAF, KENNETH G. LONG TERM EFFECT O PA FISH COMMISSION PAPER NO. 587

CITATION	PRACTICE	RANGE TYPE	WQ WY WT FH	EM CC BM	POUNDS	INCREMENT	TO WFUD	ECONOMICS
LOOMIS, JOHN ECONOMIC LOSSES JOURNAL OP ENVI	OMIS, JOHN  ECONOMIC LOSSES TO RECREATIONAL PISHERIES DU JOURNAL OP ENVIRONMENTAL MANAGEMENT 22:85-94 PAPER NO. 561 INSTREAM PLOW NEEDS STRE	OMIS, JOHN ET AL  1986 ECONOMIC LOSSES TO RECREATIONAL PISHERIES DUE TO SMALL-HEAD HYDRO-POWER DEVEL JOURNAL OP ENVIRONMENTAL MANAGEMENT 22:85-94 PAPER NO. 561 INSTREAM PLOW NEEDS STREAM	YDRO-POWER DEVEL		,	×	:	
MACCRIMMON, HUGH R. LAB OBSERVATIONS PA FISH COMMISSIO PAPER NO. 596	GOTS, BARRA L ON EMERCENT PATTERNS N, 5TH TROUT STREAM	OP JUVENILE RAINBOW TROUT HABITAT IMPROVEMENT WORKSHOP PROC:63-76	UT SHOP PROC:63-76 X X	ш	1			,
MARCUSON, PATRICK E. OVERGRAZED STREAMB WORKSHOP: LIVESTOC PAPER NO. 636 R	rcuson, patrick e. overgrazed streambanks depress pishery productic workshop: livestock/wildlipe-pish relationships paper no. 636 range management stream		1977 IN GREAT BASIN PROC:143-157 X ~ X		×	×		,
MEYER, P. CALCULATION OP I BONNEVILLE POWEI PAPER NO. 753	YER, P. CALCULATION OP ENVIRON COSTS/BENEPITS BONNEVILLE POWER ADMIN, OFFICE OP ENVIPAPER NO. 753 MULTIPLE	YER, P.  CALCULATION OP ENVIRON COSTS/BENEPITS ASSOCIATED WITH HYDROPOWER DEVEL IN PNW BONNEVILLE POWER ADMIN, OFFICE OP ENVIRONMENTAL ANALYSIS, PORTLAND, OREGON PAPER NO. 753 MULTIPLE	WER DEVEL IN PNW TLAND, OREGON X X X X	,	,	,		
MODDE, TIMOTHY EFFECT OF WATER! GREAT BASIN NATU	DDE, TIMOTHY  EFFECT OF WATERSHED ALTERATION ON BROOK TROUT POPULAT OF GREAT BASIN NATURALIST 46(1):39-45 PAPER NO. 599  RANGE MANAGEMENT  RIPARIAN		SM BLACK HILLS STREAM X - X	_	×		,	

CITATION	PRACTICE	RANGE TYPE	WQ WY WT FH	EM CC BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
MOLLES, MANUEL C., JR. EFFECTS OF ROAD SALT EISENHOWER CONSORTIU PAPER NO. 621 ROA	LLES, MANUEL C., JR. EFFECTS OF ROAD SALTING ON AQUATIC INVI	LLES, MANUEL C., JR.  EFFECTS OF ROAD SALTING ON AQUATIC INVERTEBRATE COMMUNITIES  EISENHOWER CONSORTIUM FOR WESTERN ENVIRONMENTAL FORESTRY RESEARCH, BULLETIN 10  PAPER NO. 621 ROADS  STREAM	CH, BULLETIN 1C		,			
NELSON, W. ASSESSMENT OP E US DEPT OP INTE PAPER NO. 558	LSON, W. ASSESSMENT OP EPFECTS OF ALTERED STREAM FLOW CHARACTERISTIC US DEPT OP INTERIOR, PISH & WILDLIFE SERVICE, FWS/OBS-76/30 PAPER NO. 558 INSTREAM FLOW NEEDS STREAM	1976 AM FLOW CHARACTERISTIC ON B SERVICE, FWS/OBS-76/30 STREAM	ON FISH & WILDLIFE X X	ш		,		,
PLATTS, WILLIAM S. LIVESTOCK INTERA WORKSHOP: LIVEST PAPER NO. 638	ATTS, WILLIAM S. LIVESTOCK INTERACTIONS WITH PISH AND THWORKSHOP: LIVESTOCK/WILDLIPE-FISH RELATPAPER NO. 638 RANGE MANAGEMENT	ATTS, WILLIAM S. ET AL LIVESTOCK INTERACTIONS WITH PISH AND THEIR ENVIRONMENTS WORKSHOP: LIVESTOCK/WILDLIPE-FISH RELATIONSHIPS IN GREAT BASIN PROC:36-40 PAPER NO. 638 RANGE MANAGEMENT RIPARIAN	PROC: 36-40					
PLATTS, WILLIAM S. METHODS POR EVAL USFS INT-138 GEN PAPER NO. 601	ATTS, WILLIAM S. ET AL METHODS POR EVALUATING STREAM, RIPARIAN USFS INT-138 GENERAL TECHNICAL REPORT PAPER NO. 601 GENERAL	ATTS, WILLIAM S. ET AL METHODS POR EVALUATING STREAM, RIPARIAN, AND BIOTIC CONDITIONS USFS INT-138 GENERAL TECHNICAL REPORT PAPER NO. 601 GENERAL	× , ,		×	,	,	,
RINNE, JOHN N. MOVEMENT, HOME NORTH AMERICAN PAPER NO. 597	NNE, JOHN N. MOVEMENT, HOME RANGE & GROWTH OF RARE S NORTH AMERICAN JOURNAL OF PISHERIES MAN PAPER NO. 597 STREAM IMPROVEMENT	NNE, JOHN N. MOVEMENT, HOME RANGE & GROWTH OP RARE SW TROUT IN IMPROVED/UNIMPROVED HABITATS NORTH AMERICAN JOURNAL OP PISHERIES MANAGEMENT 2:150-157 PAPER NO. 597 STREAM IMPROVEMENT	PROVED HABITATS	ra.		,	•	,

CITATION PRACTICE RANGE TYPE	WQ WY WT FH EM	EM CC BM	NUMBERS/ POUNDS	INCREMENT	CONVERT	
SHEPARD, BRADLEY B. ET AL  MONITORING LEVELS OF FINE SEDIMENT WITHIN TRIBUTARIES TO FLATHEAD LAKE  PAPER PRESENTED AT WILD TROUT III SYMPOSIUM, YELLOWSTONE NATL PARK, SEPT. 1984  PAPER NO. 589  X - X	EAD LAKE PARK, SEPT. 1984 X - X E					PCONOMICS .
SORG, CINDY F.  NET ECONOMIC VALUE OF COLD AND WARM WATER PISHING IN IDAHO USFS RM-11 RESOURCE BULLETIN PAPER NO. 647 INSTREAM FLOW NEEDS STREAM	•	,			,	D.
STANDAGE, RICHARD W.  STREAMBANK STABILIZATION USING GEOMATRIX MATTING SIMPSON CREEK, VIRGINIA PA FISH COMMISSION, 5TH TROUT STREAM HABITAT IMPROVEMENT WORKSHOP PROC:191-198 PAPER NO. 586 STREAM IMPROVEMENT STREAM	EK, VIRGINIA IOP PROC:191-198	^	×		·	
STUBER, ROBERT J.  TROUT HABITAT, ABUNDANCE, FISHING OPPORTUNITIES IN FENCED VS UNFENCED RIPARIAN USFS RM-120 GENERAL TECHNICAL REPORT PAPER NO. 600 RANGE MANAGEMENT RIPARIAN X - ' X	FENCED RIPARIAN X - X	×		, ×	,	

EMPIRICAL APPROACH FOR EVAL MICROHABITAT RESPONSE TO STREAMFLOW STEEP..STREAMS AM FISHERIES SOCIETY, SYMPOSIUM ON SMALL HYDROPOWER AND FISHERIES PROC:215-222

BALDRIGE, JEAN E.

TRIHEY, E. WOODY

STREAM

PAPER NO. 605 INSTREAM PLOW NEEDS

	OMICS					В, С	
	ECON	! !				:	
CONVERT	TO WFUD						
	INCREMENT TO WFUD ECONOMICS					×	
NUMBERS/	EM CC BM POUNDS					ı	
	SM CC BM					ပ	
	WQ WY WT FH			REEK, NEBRASKA	WLIMITED (PUB):53-55	×	
	RANGE TYPE		1978	EPPECTS OF LIVESTOCK GRAZING UPON RAINBOW TROUT IN OTTER CREEK, NEBRASKA	PORUM - GRAZING & RIPARIAN/STREAM ECOSYSTEMS PROC, TROUT UNLIMITED (PUB):53-55	STREAM	
	PRACTICE		A S	STOCK GRAZING UPON B	& RIPARIAN/STREAM E	RANGE MANAGEMENT	
	CITATION		VAN VELSON, RODNEY	EPPECTS OF LIVE	PORUM - GRAZING	PAPER NO. 641	

# FISHERIES MODEL - CITATIONS FOR NON-THOUT AND NON-SALMON SPECIES

	PRACTICE			EM CC BM	POUNDS	INCREMENT	TO WFUD	ECONOMICS
AMERICAN FISHERIES SOC MONETARY VALUES OP P AMERICAN FISHERIES SO PAPER NO 646 GEN	RESHWATER PISH A	AND PISH-KILL COUNTING GUIDELINES PUBLICATION 13	INES				>	a
		1983					<	
THE EFFECTS OP PC ARKANSAS WATER RE PAPER NO. 552	THE EFFECTS OP FOREST HARVEST ON WATER QARKANSAS WATER RESOURCES RESEARCH CTR, UPAPER NO. 552 LOGGING SYSTEM	QUALITY AND AQUATIC LIFE (PHASE I) UNIV OF AR, FAYETTEVILLE, AR, A-05 STREAM X -	(PHASE I) AR, A-052-ARK X		×	,	ı	,
BEASLEY, R. SCOTT SEDIMENT LOSSES F USFS SE-24 GTR, 2 PAPER NO. 465	ASLEY, R. SCOTT GRANILLO, ALFREDO B. SEDIMENT LOSSES FROM FOREST PRACTICES IN THE USFS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVIC PAPER NO. 465 LOGGING SYSTEM FORE	ASLEY, R. SCOTT GRANILLO, ALFREDO B.  SEDIMENT LOSSES FROM FOREST PRACTICES IN THE GULF COASTAL PLAIN OF ARKANSAS USFS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:461-467 PAPER NO. 465 LOGGING SYSTEM FORESTED X x x	OF ARKANSAS P PROC: 461-467 X - X X					
CARTER, JOHN G. FISHERIES HABITAT JOURNAL OF FRESHW PAPER NO. 610	FISHERIES HABITAT DYNAMICS IN THE UPPER CO JOURNAL OF FRESHWATER ECOLOGY 3(2):249-264 PAPER NO. 610 INSTREAM FLOW NEEDS RI	1985 UPPER COLORADO RIVER ::249-264 :DS RIVER	× '			,		,
CLAIRE, ERROL W. STREAMSIDE MGMT & WORKSHOP: LIVESTC PAPER NO. 626	AIRE, ERROL W. STORCH, ROBERT L. STREAMSIDE MGMT & LIVESTOCK GRAZING IN BL WORKSHOP: LIVESTOCK/WILDLIFE-PISH RELATIOPPER NO. 626 RANGE MANAGEMENT R	ERT L.  I 1977 I IN BLUE MOUNTAINS OF OREGON: A CASE STUELATIONSHIPS IN GREAT BASIN PROC:111-128 RIPARIAN	A CASE STUDY ROC:111-128		ı	,	ı	,

# FISHERIES MODEL - CITATIONS FOR NON-TROUT AND NON-SALMON SPECIES

CITATION	PRACTICE	RANGE TYPE	WQ WY WT FH	EM CC BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
DOMBECK, MICHAEL P. NATURAL MUSKELLUN IOWA AGRIC & HOME PAPER NO. 616	ET AL GE REPRODUCTION IN ECONOMICS EXPERIMI GENERAL	1984 MIDWESTERN LAKES ENT STA, AMES, IOWA, JOURNAL PAPER LAKE X	PAPER J-11373		,			1
DUFF, DONALD A. INDEXED BIBLIC USFS INTERMOUN PAPER NO. 608	FF, DONALD A. INDEXED BIBLIOGRAPHY ON STREAM HABITAT IMPROVEMENT USFS INTERMOUNTAIN REGION, WILDLIFE MANAGEMENT STA PAPER NO. 608 STREAM IMPROVEMENT STREAM	1986 AT IMPROVEMENT MANAGEMENT STAFF STREAM	× , ,		,	,	ı	r
FAUSCH, KURT D. MODELS THAT PF UNPUBLISHED PAPER NO. 613	USCH, KURT D. PARSONS, MIT G. MODELS THAT PREDICT STANDING CROP OP ST UNPUBLISHED PAPER NO. 613 GENERAL PAPER	G. STREAM FISH FROM HABITAT VARIABLES	ARIABLES	æ	,			1
JOHNSON, R. ROY (ED) IMPORTANCE, PRESER USFS RM-43 GENERAL PAPER NO. 731 G	JONES, DALE VATION AND MANAGE TECHNICAL REPORT ENERAL WATERSHED	∢	SYMPOSIUM X X		ı		,	,
KELLER, CHARLES FISH HABITAT C FORUM - GRAZIN PAPER NO. 633	LLER, CHARLES ET AL FISH HABITAT CHANGES IN SUMMIT CREEK, IDAHO, FORUM - GRAZING & RIPARIAN/STREAM ECOSYSTEMS PAPER NO. 633 RANGE MANAGEMENT RIPAE	LLER, CHARLES ET AL FISH HABITAT CHANGES IN SUMMIT CREEK, IDAHO, AFTER FENCING THE RIPARIAN AREA FORUM - GRAZING & RIPARIAN/STREAM ECOSYSTEMS PROC, TROUT UNLIMITED (PUB):46-52 PAPER NO. 633 RANGE MANAGEMENT RIPARIAN	RIPARIAN AREA TED (PUB):46-52		,	×	,	

# FISHERIES MODEL - CITATIONS FOR NON-TROUT AND NON-SALMON SPECIES

CITATION	PRACTICE	RANGE TYPE	WQ WY WT PH	EM CC BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
KOBER, WAYNE W. ANALYSIS OF DES PA FISH COMMISS PAPER NO. 619	BER, WAYNE W.  ANALYSIS OF DESIGN FEATURES IN MITIGATING HIGHWAY CONSTRUCT IMPACTS ON STREAMS PA FISH COMMISSION, 5TH TROUT STREAM HABITAT IMPROVEMENT WORKSHOP PROC:221-232 PAPER NO. 619 ROADS  STREAM	E. 1986 ING HIGHWAY CONSTRUCT II ABITAT IMPROVEMENT WORK STREAM	MPACTS ON STREAM SHOP PROC: 221-23	\$ 25	,	,		B 2
MARCUSON, PATRICK E. OVERGRAZED STREAMB WORKSHOP: LIVESTOC PAPER NO. 636 R	1977  OVERGRAZED STREAMBANKS DEPRESS PISHERY PRODUCTION IN ROCK CREEK, MONTANA WORKSHOP: LIVESTOCK/WILDLIFE-PISH RELATIONSHIPS IN GREAT BASIN PROC:143-157 PAPER NO. 636 RANGE MANAGEMENT STREAM X - X	1977 PRODUCTION IN ROCK CRETIONSHIPS IN GREAT BASI	EK, MONTANA N PROC:143-157 X - X		. ×	×	,	ı
NELSON, W. ASSESSMENT OP I US DEPT OP INTI	LSON, W.  ASSESSMENT OF EPPECTS OP ALTERED STREAM PLOW CHARACTERISTIC ON PISH & WILDLIFE US DEPT OP INTERIOR, FISH & WILDLIFE SERVICE, FWS/OBS-76/30 PAPER NO. 558 INSTREAM FLOW NEEDS STREAM	1976 m Plow characteristic oi ervice, Fws/obs-76/30 stream	N PISH & WILDLIF X X	<u> </u>			1	,
PLATTS, WILLIAM S. LIVESTOCK INTERA WORKSHOP: LIVEST PAPER NO. 638	ATTS, WILLIAM S. ET AL LIVESTOCK INTERACTIONS WITH PISH AND THEIR ENVIRONMENTS WORKSHOP: LIVESTOCK/WILDLIFE-PISH RELATIONSHIPS IN GREAT BASIN PROC:36-40 PAPER NO. 638 RANGE MANAGEMENT RIPARIAN	1977 HEIR ENVIRONMENTS TIONSHIPS IN GREAT BASII RIPARIAN	N PROC: 36-40				•	,
PLATTS, WILLIAM S. METHODS FOR EVAL USFS INT-138 GEN PAPER NO. 601	ATTS, WILLIAM S. ET AL METHODS FOR EVALUATING STREAM, RIPARIAN, AND BIOTIC CONDITIONS USFS INT-138 GENERAL TECHNICAL REPORT RIPARIAN & STREAM RAPER NO. 601	1983 N, AND BIOTIC CONDITION: RIPARIAN & STREAM	× · · · ×		×		•	,

FISHERIES MODEL - CITATIONS FOR NON-TROUT AND NON-SALMON SPECIES

	ECONOMICS				D. 8
CONVERT	TO WFUD				
	INCREMENT				
NUMBERS/	POUNDS				i
	EM CC BM				
	WQ WY WT PH EM CC BM POUNDS INCREMENT TO WFUD ECONOMICS				•
	RANGE TYPE	 1985	WATER FISHING IN IDAHO		STREAM
	PRACTICE	ET AL	NET ECONOMIC VALUE OF COLD AND WARM WA	RCE BULLETIN	INSTREAM PLOW NEEDS
	CITATION	SORG, CINDY P.	NET ECONOMIC VAL	USFS RM-11 RESOURCE BULLETIN	PAPER NO. 647

## FISHERIES MODEL - CITATIONS FOR UNSPECIFIED PISH SPECIES

CITATION	PRACTICE	RANGE TYPE	WQ WY WT FH	EM CC BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WPUD	ECONOMICS
BROUHA, PAUL FORESTERS ARE P	OUHA, PAUL PARSONS, MIT G FORESTERS ARE PISH HABITAT MANAGERS	. 1985				1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	! ! ! !	 
1985 SOCIETY OF PAPER NO. 551	AMERICAN PORESTERS NAT	1985 SOCIETY OF AMERICAN PORESTERS NATIONAL CONVENTION PROC:175-178 PAPER NO. 551 LOGGING SYSTEM RIPARIAN X	-178 x x x			ı	:	ı
BURROUGHS, E. R. RELATIVE EFFECT 21ST ANNUAL ENG PAPER NO. 620	ET AL IVENESS OP ROCKED ROADS INEERING GEOLOGY & SOIL ROADS	RROUGHS, E. R.  RELATIVE EFFECTIVENESS OF ROCKED ROADS AND DITCHES IN REDUCING SURFACE EROSION 21ST ANNUAL ENGINEERING GEOLOGY & SOILS ENGINEERING SYMP PROC, U OF ID:251-263 PAPER NO. 620 ROADS  X - X	SURFACE EROSION U OP ID:251-263 X ~ ~ X	z m				
CLINE, LEO D. THE INERTIA AND USFS RM-65 GENE PAPER NO. 622	INE, LEO D. THE INERTIA AND RESILIENCY OF A MOUNTA USFS RM-65 GENERAL TECHNICAL REPORT:61 PAPER NO, 622 ROADS	INE, LEO D.  THE INERTIA AND RESILIENCY OF A MOUNTAIN STREAM TO CONSTRUCTION IMPACT USFS RM-65 GENERAL TECHNICAL REPORT:617-620 PAPER NO. 622 ROADS STREAM X -	IMPACT X - X		,	,	,	,
CLINE, RICHARD GUIDE FOR PREDI USFS NORTHERN R PAPER NO. 617	INE, RICHARD  GUIDE FOR PREDICTING SEDIMENT YIELDS F USFS NORTHERN REGION, INTERMOUNTAIN RE PAPER NO. 617 MULTIPLE	1981 FROM FORESTED WATERSHEDS REGION, SOIL AND WATER MANAGEMENT PORESTED X -	GEMENT X X			ı		,
EVANS, ELWIN D. ESTIMATING STRE USFS RM-65 GENE PAPER NO. 607	ANS, ELWIN D. ESTIMATING STREAM MACROBENTHOS BENEFIT USFS RM-65 GENERAL TECHNICAL REPORT:49 PAPER NO. 607 INSTREAM FLOW NEEDS	ANS, ELWIN D. ESTIMATING STREAM MACROBENTHOS BENEFITS FROM LOW FLOW AUGMENTATION USFS RM-65 GENERAL TECHNICAL REPORT:491-495 PAPER NO. 607 INSTREAM FLOW NEEDS RIVER	NOI X		,		,	ı

# FISHERIES MODEL - CITATIONS FOR UNSPECIFIED FISH SPECIES

CITATION	PRACTICE	RANGE TYPE	WQ WY WT PH	EM CC BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WPUD	ECONOMICS
FELLER, M. C. EFFECTS OF CLEA WATER RESOURCES PAPER NO. 555	EFFECTS OF CLEARCUTTING & SLASHBURNING ON STREAM TEMP IN WATER RESOURCES BULLETIN 17(5):863-868 PAPER NO. 555 LOGGING SYSTEM STREAM		SW BRITISH COLUMBIA		,	,	1	:
GARY, HOWARD L. CATTLE GRAZING JOURNAL OP SOIL PAPER NO. 640	RY, HOWARD L.  CATTLE GRAZING IMPACT ON SURFACE WATER QUALITY IN COLORADO FRONT RANGE STREAM JOURNAL OP SOIL AND WATER CONSERVATION 38(2):124-128 PAPER NO. 640 RANGE MANAGEMENT STREAM	1983 quality in colorado fi 38(2):124-128 stream	RONT RANGE STREAM		•			ı
GREGG, RON A METHOD FOR AN FORUM - GRAZING PAPER NO. 634	EGG, RON A METHOD FOR ANALYZING LIVESTOCK IMPACTS ON STREAM FORUM - GRAZING & RIPARIAN/STREAM ECOSYSTEMS PROC, PAPER NO. 634 RANGE MANAGEMENT RIPARIAN		1978 AND RIPARIAN HABITATS TROUT UNLIMITED (PUB):92-94 X ~ x	7	•	,	ı	,
GREGORY, K. J. THE PERMANENCE HYDROLOGICAL SC PAPER NO. 603	EGORY, K. J.  THE PERMANENCE OF DEBRIS DAMS RELATED TO RIVER CHANNEL PROCESSES HYDROLOGICAL SCIENCES JOURNAL 30(3):371-381 PAPER NO. 603 - STREAM	1985 ED TO RIVER CHANNEL PROCE: :371-381 STREAM	× × × · · · ·			,		,
HEEDE, BURCHARD H. CHANNEL ADJUSTME ENVIRONMENTAL MA PAPER NO. 602	NTS TO THE REMOVAL. NAGEMENT 9(5):427-4 GENERAL	1985 OF LOG STEPS: AN EXPERIMENT IN 32 STREAM X	T IN A MTN STREAM	E			,	,

# FISHERIES MODEL - CITATIONS FOR UNSPECIFIED PISH SPECIES

CITATION	PRACTICE	RANGE TYPE	WQ WY WT FH EM CC BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
KLOCK, G. O. MODELING CUMUL JOURNAL OF SOI PAPER NO. 604	OCK, G. O.  MODELING CUMULATIVE EPPECT OF FOREST PRACTICES ON DOWNSTREAM JOURNAL OF SOIL AND WATER CONSERVATION (MARCH-APRIL):237-241 PAPER NO. 604 MULTIPLE STREAM	OCK, G. O.  MODELING CUMULATIVE EPPECT OF FOREST PRACTICES ON DOWNSTREAM AQUATIC ECOSYSTEM JOURNAL OF SOIL AND WATER CONSERVATION (MARCH-APRIL):237-241  PAPER NO. 604 MULTIPLE STREAM	JATIC ECOSYSTEM	,			
MARTIN, S. CLARK EVALUATING IMP FORUM - GRAZIN PAPER NO. 631	ACT CATTLE GRAZING ON G & RIPARIAN/STREAM EC RANGE MANAGEMENT	1978 EVALUATING IMPACT CATTLE GRAZING ON RIPARIAN HABITATS IN NATL FORESTS OF AZ/NM FORUM - GRAZING & RIPARIAN/STREAM ECOSYSTEMS PROC, TROUT UNLIMITED (PUB):35-38 PAPER NO. 631 RANGE MANAGEMENT RIPARIAN	DRESTS OF AZ/NM FED (PUB):35-38	,		,	
MAY, BRUCE E. PRACTICES FOR U OF ID, DEPT PAPER NO. 635	DAVIS, BARRY LIVESTOCK GRAZING & AQUA? OP WILDLIPE RES, WILDLIPI RANGE MANAGEMENT	IV, BRUCE E.  PRACTICES FOR LIVESTOCK GRAZING & AQUATIC HABITAT PROTECTION ON WEST RANGELA U OF ID, DEPT OP WILDLIFE RES, WILDLIFE-LIVESTOCK RELATION SYMP PROC:271-278 PAPER NO. 635 RANGE MANAGEMENT RIPARIAN	WEST RANGELAND PROC:271-278			,	,
NARAYANAN, RANGESAN EVALUATION OF RECI JOURNAL OF LEISURI PAPER NO. 560	REATIONAL BENEFITS E RESEARCH 18(2):11 INSTREAM FLOW NEEDS	1986 OP INSTREAM FLOWS 6-128 RIVER	× × ×		,	,	B U
OLSON, JAMES E. SUCCESS & POTE USFS RM-65 GEN PAPER NO. 644	SON, JAMES E. SUCCESS & POTENTIAL SUCCESSFUL MEASURE T USFS RM-65 GENERAL TECHNICAL REPORT:429- PAPER NO. 644 STREAM IMPROVEMENT	SON, JAMES E. SUCCESS & POTENTIAL SUCCESSPUL MEASURE TO PROTECT/IMPROVE FISH/WILDLF HABITAT USFS RM-65 GENERAL TECHNICAL REPORT: 429-433 PAPER NO. 644 STREAM IMPROVEMENT STREAM	VILDLP HABITAT				о. В

# FISHERIES MODEL - CITATIONS FOR UNSPECIFIED FISH SPECIES

CITATION	PRACTICE	RANGE TYPE	WQ WY WT FH	EM CC BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
ORSBORN, JOHN F. STREAM IMPROVEME WATER RESOURCES PAPER NO. 611	SBORN, JOHN F. ANDERSON, JOHN STREAM IMPROVEMENTS AND FISH RESPONSE: WATER RESOURCES BULLETIN 22(3):381-388 PAPER NO. 611 STREAM IMPROVEMENT	W. 1986 A BIO-ENGINEERING ASSESSMENT STREAM	ASSESSMENT	1 1 1 1 1 1 1 1 1				
ROBERTS, RICHARD G. SEDIMENT BUDGET I CANADIAN JOURNAL PAPER NO. 554	CHURCH, MICH N SEVERELY DISTURBE OF FOREST RESEARCH LOGGING SYSTEM		1986 QUEEN CHARLOTTE RANGES, BC			,	ı	,
SEDELL, JAMES R. IMPORTANCE OF STREAMSIDE FORE COPIES AVAILABLE UPON REQUEST PAPER NO. 606	ATT, JU STS TO	RIVERS:	1984 INSOLATION WILLAMETTE RVR		,			
STORCH, ROBERT L. LIVESTOCK/STREAM FORUM - GRAZING PAPER NO. 625	ORCH, ROBERT L. LIVESTOCK/STREAMSIDE MANAGEMENT PROGRAMS IN EASTERN OREGON FORUM - GRAZING & RIPARIAN/STREAM ECOSYSTEMS PROC, TROUT U PAPER NO. 625 RANGE MANAGEMENT RIPARIAN	1978 S IN EASTERN OREGC STEMS PROC, TROUT RIPARIAN	1978 N OREGON TROUT UNLIMITED (PUB):56-59	σ.	,			
VAN HAVEREN, BRUCE P. MANAGEMENT OF INSTR WATER RESOURCES BUL PAPER NO. 563 IN	EAM PLOWS THROUGH LETIN 22(3):399-46 STREAM FLOW NEEDS	1986 RUNOFF DETENTION AND RETENTION 04	RETENTION X X X X		,			,

# FISHERIES MODEL - CITATIONS FOR UNSPECIFIED FISH SPECIES

	S	-				
	ECONOMIC					., B,C
CONVERT	TO WFUD					,
	INCREMENT TO WFUD ECONOMICS					,
NUMBERS/	POUNDS					,
	EM CC BM POUNDS					
	WQ WY WT FH		1984		ATE UNIV:285-300	x x x .
	RANGE TYPE			OPTIMALLY MANAGING WILD RIVERS FOR INSTREAM BENEFITS	1984 NATIONAL RIVER RECREATION SYMPOSIUM PROC, LA STATE UNIV:285-300	NEEDS RIVER
	PRACTICE			IAGING WILD RIVERS	RIVER RECREATION	INSTREAM FLOW NEEDS
	CITATION		WARD, FRANK A.	OPTIMALLY MAN	1984 NATIONAL	PAPER NO. 559



CITATIONS FOR FORAGE MODEL



X X X					INDUCED	CONVERSION	INDUCED	
ER HARVESTING  WASTES & TAILINGS IN SW, UNIV OF AZ-MINE RECLAMATION CENTER VEGETATIVE MGMT  SMOLIAK, S.  1973  UALITY THROUGH CONTROL OF AQUATIC VEGETATION ON REQUEST  WATER BEVELOPMENT  FECT OF FOREST MGMT ON FLOODS, SEDIMENTATION & WATER SUPPLY TECHNICAL REPORT  GENERAL WATERSHED MGMT  1971  NAGEMENT 24(3):188-197  RANGE REHABILITATION  1984  INTENSITY & SPECIALIZED GRAZING SYSTEMS ON WATERSHED CHARAC ES FOR RANGELAND MANAGEMENT, WESTVIEW PRESS, BOULDER, CO GHAZING SYSTEM  VARIOUS  1984  1075  1076  1077  107	CITATION	PRACTICE	RANGE TYPE	FORAGE	OUTPUT	ANIMALS	ANIMALS	ECONOMICS
WESTES & TAILINGS IN SW, UNIV OP AZ-MINE RECLAMATION CENTER VEGETATIVE MCMT  SMOLIAK, S.  1973  UALITY THROUGH CONTROL OP AQUATIC VEGETATION ON REQUEST  WATER DEVELOPMENT  FECT OF POREST MCMT ON FLOODS, SEDIMENTATION & WATER SUPPLY TECHNICAL REPORT  GENERAL WATERSHED MCMT  1971  N-JUNIPER CONVERSION TO GRASSLAND  NAGEMENT 24(3):188-197  RANGE REHABILITATION PINYON-JUNIPER X X X  1984  11971  AND THENSITY & SPECIALIZED GRAZING SYSTEMS ON WATERSHED CHARAC ES FOR RANGELAND MARAGEMENT, WESTVIEW PRESS, BOULDER, CO GHAZING SYSTEM  VARIOUS	ALDON, EARL F. MICRO-CATCHMENT W	/ATER HARVESTING	1980		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	 		1 1 1 1 1 1 1 1 1
SMOLIAK, S.  SMOLIAK, S.  UALITY THROUGH CONTROL OP AQUATIC VEGETATION ON REQUEST  WATER DEVELOPMENT  ET AL  SECT OP FOREST MGMT ON PLOODS, SEDIMENTATION & WATER SUPPLY TECHNICAL REPORT  GENERAL WATERSHED MGMT  N-JUNIPER CONVERSION TO GRASSLAND  NAGEMENT 24(3):188-197  RANGE REHABILITATION TO GRASSLAND  1984  INTENSITY & SPECIALIZED GRAZING SYSTEMS ON WATERSHED CHARAC  ES FOR RANGELAND MANAGEMENT, WESTVIEW PRESS, BOULDER, CO  GHAZING SYSTEM  VARIOUS	VEG RECLAM OP MIN PAPER NO. 391		UNIV OF AZ-MINE RECLAMATION DESERT GHASSLAND	CENTER	·	ı	ı	1.0
WATER DEVELOPMENT  ET AL  I1986  FECT OF FOREST MGMT ON FLOODS, SEDIMENTATION & WATER SUPPLY TECHNICAL REPORT  GENERAL WATERSHED MGMT  N-JUNIPER CONVERSION TO GRASSLAND  NAGEMENT 24(3):188-197  RANGE REHABILITATION PINYON-JUNIPER X X X  I1984  INTENSITY & SPECIALIZED GRAZING SYSTEMS ON WATERSHED CHARAC  ES FOR RANGELAND MANAGEMENT, WESTVIEW PRESS, BOULDER, CO  GHAZING SYSTEM  VARIOUS  .	ALLAN, J. R. MAINTAINING WATER	SMOLIAK, S.	1973 • AQUATIC VEGETATION					
FECT OF FOREST MGMT ON FLOODS, SEDIMENTATION & WATER SUPPLY GENERAL WATERSHED MGMT  GENERAL WATERSHED MGMT  1971  N-JUNIPER CONVERSION TO GRASSLAND  NAGEMENT 24(3):188-197  RANGE REHABILITATION PINYON-JUNIPER X X X  1984  INTENSITY & SPECIALIZED GRAZING SYSTEMS ON WATERSHED CHARAC  ES FOR RANGELAND MANAGEMENT, WESTVIEW PRESS, BOULDER, CO  GHAZING SYSTEM  VARIOUS	COPIES AVAILABLE PAPER NO. 370	UPON REQUEST WATER DEVELOPMENT	ı	*	ŧ	ł	i	ì
FECT OF FOREST MGMT ON FLOODS, SEDIMENTATION & WATER SUPPLY GENERAL WATERSHED MGMT  "-JUNIPER CONVERSION TO GRASSLAND NAGEMENT 24(3):188-197 RANGE REHABILITATION PINYON-JUNIPER X X  1984  INTENSITY & SPECIALIZED GRAZING SYSTEMS ON WATERSHED CHARAC ES FOR RANGELAND MANAGEMENT, WESTVIEW PRESS, BOULDER, CO GRAZING SYSTEM VARIOUS	ANDERSON, HENRY W.	ET AL	1986					
NAGEMENT 24(3):188-197  RANGE REHABILITATION PINYON-JUNIPER X X X  1984  INTENSITY & SPECIALIZED GRAZING SYSTEMS ON WATERSHED CHARAC  ES FOR RANGELAND MANAGEMENT, WESTVIEW PRESS, BOULDER, CO  GRAZING SYSTEM VARIOUS	PORESTS & WATER: USFS PSW-18 GENER PAPER NO. 719	EPFECT OP FOREST MGMT ON FLAAL TECHNICAL REPORT GENERAL WATERSHED MGMT	,	SUPPLY	,	t	ı	,
NAGEMENT 24(3):188-197  RANGE REHABILITATION PINYON-JUNIPER X X X  RANGE REHABILITATION PINYON-JUNIPER X X X  1984  INTENSITY & SPECIALIZED GRAZING SYSTEMS ON WATERSHED CHARAC  ES FOR RANGELAND MANAGEMENT, WESTVIEW PRESS, BOULDER, CO  GRAZING SYSTEM VARIOUS	A POLITICAL DE LA POLITICA DE LA POL		1071					
RANGE REHABILITATION PINYON-JUNIPER X X X X X I 1984  INTENSITY & SPECIALIZED GRAZING SYSTEMS ON WATERSHED CHARAC  ES FOR RANGELAND MANAGEMENT, WESTVIEW PRESS, BOULDER, CO  GRAZING SYSTEM VARIOUS	EVALUATION OP PIN JOURNAL OF RANGE	VYON-JUNIPER CONVERSION TO G MANAGEMENT 24(3):188-197	RASSLAND					
1984 INTENSITY & SPECIALIZED GRAZING SYSTEMS ON WATERSHED CHARAC ES FOR RANGELAND MANAGEMENT, WESTVIEW PRESS, BOULDER, CO GRAZING SYSTEM VARIOUS	PAPER NO. 304	RANGE REHABILITATION	PINYON-JUNIPER	×	×	×	×	В, С
MANAGEMENT, WESTVIEW PRESS, BOULDER, CO  VARIOUS	BLACKBURN, WILBERT IMPACTS OF GHAZIN	Н. ig intensity & Specialized G	1984 RAZING SYSTEMS ON WATERSHED	CHARAC				
	DEVELOPING STRATE PAPER NO. 411		INT, WESTVIEW PRESS, BOULDER VARIOUS	00 ,	ı	,	ı	,

MAS C.  127 RESEARCH PAPER  127 RESEARCH PAPER				POUNDS	INDUCED	CONVERSION TO NUMBER	INDUCED	
ON POTENTIAL IN AZ, PART II: AN ECONOMIC ANALYSIS  UVEGETATUE MGMT  CHAPARRAL  1982  OF TIMBER, PORAGE, & WATER YIELDS FROM PUBLIC FONEST LANDS  TECHNICAL REPORT  ECONOMIC ANALYSIS  OGIPPORD, GERALD F.  GIPPORD, GERALD F.  GIPPORD, GERALD F.  I 976  GARSEN T 29(2):109-113  PINYON-JUNIPER  ET AL  GRAZING  ET AL  GRAZING  ET AL  SANGEMENT 27(2):443-145  RANGERET 27(2):443-145  RANGERET 27(2):443-145  RANGERET 27(2):443-145	CITATION	PRACTICE	RANGE TYPE	FORAGE	OUTPUT	ANIMALS	ANIMALS	ECONOMICS
CHERNTIAL IN AZ. PART II: AN ECONOMIC ANALYSIS  CH PAPER  VEGETATIVE MGMT  CHAFARRAL  TECHNICAL REPORT  ECONOMIC ANALYSIS  CIPPORD. GERALD F.  OF TIMBER, PORACE. & WATER VIELDS FROM PUBLIC FOREST LANDS  TECHNICAL REPORT  CIPPORD. GERALD F.  OF TIMER SITES-SOME CHEM WATER QUAL IMPLICATIONS  ANAGEMENT 29(4):299-301  VEGETATIVE MGMT  CAIPORD, GERALD F.  I 1976  CIPPORD, GERALD F.  I 1976  CIPPORD, GERALD F.  I 1976  CAIPORD, GERALD F.  I 1976  CAIPORD, GERALD F.  I 1976  CAIPORD, GERALD F.  I 1976  CAIPORD OF CATTLE GRAZING ON SEMIARID WATERSHED IN SE UTAH  NAGEMENT 29(2):109-113  PRINON-JUNIPER  CRAZING  FET AL  CATALL SALASING NONDENOSA PINE WOODLANDS  ANAGEMENT 27(2):143-145  RANGE BEHABILITATION  FONDENOSA PINE  TO A  TO	BROWN, THOMAS C.		1974			1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
USCETATIVE MCMT  USCETATIVE MCMT  USB2  USB2  OF TIMBER, FORACE, & WATER VIELDS FROM PUBLIC FOREST LANDS  TECHNICAL REPORT  ECONOMIC ANALYSIS  OG SIPPORD, GERALD F.  UNO PINYON-JUNIPER SITES-SOME CHEM WATER QUAL IMPLICATIONS  ANACEMENT 29(4):299-301  VECETATIVE MCMT  USBA110 PINYON-JUNIPER  GIPPORD, GERALD F.  USPA110 PINYON-JUNIPER  GRAZING  ET AL  GRAZING  GRAZING  GRAZING  GRASSES AND REVGECTATION IN PONDEROSA PINE WOODLANDS  ANACEMENT 27(2):149-145  RANGE REHABILITATION  PONDEROSA PINE  X  X  Y  X  Y  X  Y  Y  Y  Y  Y  Y  Y	CHAPARRAL CONVERS							
OF TIMBER, FORACE, & WATER VIELDS PROM PUBLIC FOREST LANDS TECHNICAL REPORT ECONOMIC ANALYSIS  GIPPORD, GERALD F. 1976  GIPPORD, GERALD F. 1976  ANAGEMENT 29(4):299-301  VEGETATIVE MGMT  PINYON-JUNIPER  GIFPORD, GERALD F. 1976  CIFPORD, GERALD F. 1976  ICATIONS OP CATTLE GRAZING ON SEMIABLD WATERSHED IN SE UTAH ANAGEMENT 29(2):109-113  GRAZING  ET AL  ET AL  1974  RAZEMENT 27(2):143-145  RANGE REHABILITATION IN PONDEROSA PINE  X X X	PAPER NO. 521	VEGETATIVE MGMT	CHAPARRAL	×	×	ė	×	B,C,B/C
OF TIMBER, FORAGE, & WATER VIELDS PROM PUBLIC FOREST LANDS  TECHNICAL REPORT  ECONOMIC ANALYSIS  GIFFORD, GERALD F. 1976  NON PINYON-JUNIPER SITES-SOME CHEM WATER QUAL IMPLICATIONS  NAAGEMENT 29(4):299-301  VEGETATIVE MGMT  GIFFORD, GERALD P. 1976  GIFFORD, GERALD P. 1976  GAZING  GAZING  FET AL 1974  ER AL 1974  RANGEMENT 29(2):109-113  FINYON-JUNIPER								
OF TIMBER, FORAGE, & WATER VIELDS FROM PUBLIC FOREST LANDS  TECNNICAL REPORT  ECONOMIC ANALYSIS  GIPPORD, GERALD F. 1976  NON PINYON-JUNIPER SITES-SOME CHEM WATER QUAL IMPLICATIONS  ANAGEMENT 29(4):299-301  VEGETATIVE MGMT  GIFFORD, GERALD F. 1976  GIFFORD, GERALD F. 1976  GATZING ON SEMIARID WATERSHED IN SE UTAH  ANAGEMENT 29(2):109-113  FINYON-JUNIPER  ET AL  ET AL  1974  GRASES AND REVECETATION IN PONDEROSA PINE WOODLANDS  ANAGEMENT 27(2):149-145  RANGE REHABILITATION  PONDEROSA PINE X X X Y	BROWN, THOMAS C.		1982					
GIPPORD, GERALD F. 1976  NON PINYON-JUNIPER SITES-SOME CHEM WATER QUAL IMPLICATIONS  ANAGEMENT 29(4):299-301  VEGETATIVE MGMT  VEGETATIVE MGMT  CIPPORD, GERALD F. 1976  CIPPORD, GERALD F. 1976  CATTOL GRAZING  GRAZING  FT AL  GRAZING  FT	MONETARY VALUATIO USFS RM-95 GENERA		TELDS FROM PUBLIC FOREST	LANDS				
GIPPORD, GERALD F. 1976  NON PINYON-JUNIPER SITES-SOME CHEM WATER QUAL IMPLICATIONS  ANAGEMENT 29(4):299-301  VEGETATIVE MGMT  CIFFORD, GERALD F. 1976  GIFFORD, GERALD F. 1976  GATIONS OF CATTLE GRAZING ON SEMIARID WATERSHED IN SE UTAH  ANAGEMENT 29(2):109-113  GRAZING  ET AL  1974  GRASSES AND REVEGETATION IN PONDEROSA PINE WOODLANDS  RANGE REHABILITATION PONDEROSA PINE X X	PAPER NO. 734	ECONOMIC ANALYSIS	•	ı	1		×	В,С
GIFPORD, GERALD F. 1976  NON PINYON-JUNIPER SITES-SOME CHEM WATER QUAL IMPLICATIONS  ANAGEMENT 29(4):299-301  VEGETATIVE MGMT  CIFFORD, GERALD F. 1976  GIFFORD, GERALD F. 1976  ICATIONS OF CATTLE GRAZING ON SEMIARID WATERSHED IN SE UTAH  ANAGEMENT 29(2):109-113  GRAZING  ET AL  CRAZING  ANAGEMENT 27(2):143-145  RANGE REHABILITATION IN PONDEROSA PINE  X X								
NON PINYON-JUNIPER SITES-SOME CHEM WATER QUAL IMPLICATIONS  ANAGEMENT 29(4):299-301  VEGETATIVE MGMT  CIFFORD, GERALD P. 1976  ICATIONS OF CATTLE GRAZING ON SEMIARID WATERSHED IN SE UTAH  ANAGEMENT 29(2):109-113  GRAZING  ET AL  ET AL  I 1974  ET AL  ANAGEMENT 27(2):143-145  ANAGEMENT 27(2):143-145  RANGE REHABILITATION  NONDEROSA PINE WOODLANDS  ANAGEMENT 27(2):143-145	BUCKHOUSE, JOHN C.	GIPPORD, GERALD F.	1976					
ANAGEMENT 29(4):299-301  VEGETATIVE MGMT  CIFFORD, GERALD F. 1976  GIFFORD, GERALD F. 1976  ANAGEMENT 29(2):109-113  GRAZING  ET AL  ET AL  GRASSES AND REVEGETATION IN PONDEROSA PINE WOODLANDS  RANGE MENT 27(2):143-145  RANGE REHABILITATION  YEAR AND TO THE TOWN TOWN TOWN TOWN TOWN TOWN TOWN TOWN	GRAZING/DEBRIS BU	RN ON PINYON-JUNIPER SITES-SOM		ATIONS				
CIFFORD, GERALD F. 1976  GIFFORD, GERALD F. 1976  ANAGEMENT 29(2):109-113  GRAZING  ET AL  GRASES AND REVEGETATION IN PONDEROSA PINE WOODLANDS  RANGEMENT 27(2):143-145  RANGE REHABILITATION PONDEROSA PINE X X X	JOURNAL OF RANGE	MANAGEMENT 29(4):299-301						
GIFFORD, GERALD F. 1976  ICATIONS OF CATTLE GRAZING ON SEMIARID WATERSHED IN SE UTAH  ANAGEMENT 29(2):109-113  GRAZING  ET AL  GRAZING  ET AL  1974  GRASSES AND REVEGETATION IN PONDEROSA PINE WOODLANDS  RANGE REHABILITATION PONDEROSA PINE X X X Y	PAPER NO. 531	VEGETATIVE MGMT	PINYON-JUNIPER	ı			ı	ŧ
GIFFORD, GERALD F. 1976  ICATIONS OF CATTLE GRAZING ON SEMIARID WATERSHED IN SE UTAH  ANAGEMENT 29(2):109-113  GRAZING  FINYON-JUNIPER  THA  GRAZING  1974  GRASSES AND REVEGETATION IN PONDEROSA PINE WOODLANDS  RANGEMENT 27(2):143-145  RANGE REHABILITATION  TO SEMIARIE TO SEMIARION  TO SEMIARIE TO SEMIARION  TO SEMIARION  TO SEMIARIE TO SEMIARIE TO SEMIARION  TO SEMIARIE TO SEMIAR								
ICATIONS OF CATTLE GRAZING ON SEMIARID WATERSHED IN SE UTAH ANAGEMENT 29(2):109-113 GRAZING  GRAZING  FT AL  GRAZING  1974 GRASSES AND REVEGETATION IN PONDEROSA PINE WOODLANDS RANGEMENT 27(2):143-145 RANGE REHABILITATION  7	BUCKHOUSE, JOHN C.	GIFFORD, GERALD F.	1976					
ANAGEMENT 29(2):109-113  GRAZING  ET AL  GRASSES AND REVEGETATION IN PONDEROSA PINE WOODLANDS  RANGE REHABILITATION  PONDEROSA PINE  X  X	WATER QUALITY IMP			E UTAH				
CRAZING PINYON-JUNIPER	JOURNAL OF RANGE	MANAGEMENT 29(2):109-113						
ET AL GRASSES AND REVEGETATION IN PONDEROSA PINE WOODLANDS ANAGEMENT 27(2):143-145 RANGE REHABILITATION PONDEROSA PINE X	PAPER NO. 534	GRAZING	PINYON-JUNIPER	,	ŧ			i
ET AL GRASSES AND REVEGETATION IN PONDEROSA PINE WOODLANDS ANAGEMENT 27(2):143-145 RANGE REHABILITATION PONDEROSA PINE								
IN PONDEROSA PINE WOODLANDS PONDEROSA PINE X	CHRISTENSEN, M. DAL		1974					
N PONDEROSA PINE X	CONTROL OF ANNUAL		ONDEROSA PINE WOODLANDS					
RANGE REHABILITATION PONDEROSA PINE X	JOURNAL OF RANGE	MANAGEMENT 27(2):143-145						
	PAPER NO. 329	RANGE REHABILITATION	PONDEROSA PINE	×	×	·	ŧ	ı

USES RECION 3 PAPER NO. 698 FOREST REPORT	CITATION	PRACTICE	RANGE TYPE	POUNDS	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
FOREST REPORT  1964  DICTING POTENTIAL HERBAGE YIELD ON BEAVER CREEK PILOT WATERSHEDS  TY OF AGRONOMY, ASA SPECIAL PUBLICATION SCOCT 1964):244-250  RANGE REHABILITATION PLICATION SCOCT 1964):244-250  FOR THE FROM THE PROPERTY FOREST PRODUCTION  SEARCH NOTE  VEGETATIVE MGMT PONDEROSA PINE X  L AND WATER CONSERVATION 24(1)  RANGE REHABILITATION PONDEROSA PINE  1969  NO PRECISION FOR HERBAGE VARIABLES THRU KNOWLEDGE TMBR OVERSTORY  PONDEROSA PINE X  1969  NO PRECISION FOR HERBAGE VARIABLES THRU KNOWLEDGE TMBR OVERSTORY  PONDEROSA PINE X  THE PONDE	VASHITA PL-534	OREST - PROJECT - FLOOD PREVENTION	1980					
TY OF AGRONOMY, AS SPECIAL PUBLICATION 5 (OCT 1964):244-250  RANGE REHABILITATION PINYON-JUNIPER X  ET AL 1968  P DIPPERENT POREST PLOOR LAYERS TO HERBAGE PRODUCTION  VEGETATIVE MGMT PONDEROSA PINE X  CAPACITY OF PONDEROSA PINE POREST PLOOR LAYERS  L AND WATER CONSERVATION 24(1)  RANGE REHABILITATION PONDEROSA PINE	PAPER NO. 698	FOREST REPORT			•			B, C
ET AL  BY DIPPERENT FOREST FLOOR LAYERS TO HERBAGE PRODUCTION  SEARCH NOTE  VEGETATIVE MGMT  PONDEROSA PINE  CAPACITY OF PONDEROSA PINE  AND WATER CONSERVATION 24(1)  RANGE REHABILITATION  1969  1969  BY DIPPERENT  TO BY DIPPER	CLARY, WARREN P. METHOD FOR PRED	ICTING POTENTIAL HERBAGE YIELD (	1964 ON BEAVER CREEK PILOT WATE	ERSHEDS				
FT AL  1968  P DIPFERENT POREST FLOOR LAYERS TO HERBAGE PRODUCTION SEARCH NOTE  VEGETATIVE MGMT PONDEROSA PINE X  CAPACITY OF PONDEROSA PINE FOREST PLOOR LAYERS  L AND WATER CONSERVATION 24(1)  RANGE REHABILITATION PONDEROSA PINE  1969  NG PRECISION FOR HERBAGE VARIABLES THRU KNOWLEDGE TMBR OVERSTORY  GE MANAGEMENT 22(3):200-201  PONDEROSA PINE X	PAPER NO. 385	I OF AGRONOMI, ASA SPECIAL FUBL. RANGE REHABILITATION	ICALION 5(OCT 1904):244-6; PINYON-JUNIPER	×			•	
FPOLLIOTT, PETER F. 1969  CAPACITY OF PONDEROSA PINE FOREST FLOOR LAYERS  L AND WATER CONSERVATION 24(1)  RANGE REHABILITATION PONDEROSA PINE	CLARY, WARREN P. RELATIONSHIP OF USFS RM-123 RES	ET AL DIPFERENT POREST FLOOR LAYERS ' EARCH NOTE	1968 TO HERBAGE PRODUCTION					
FFOLLIOTT, PETER F. 1969  CAPACITY OF PONDEROSA PINE FOREST FLOOR LAYERS  L AND WATER CONSERVATION 24(1)  RANGE REHABILITATION PONDEROSA PINE	PAPER NO. 383	VEGETATIVE MGMT	PONDEROSA PINE	×	•			ı
RANGE REHABILITATION PONDEROSA PINE 1969  NG PRECISION FOR HERBAGE VARIABLES THRU KNOWLEDGE TMBR OVERSTORY  GE MANAGEMENT 22(3):200-201  PONDEROSA PINE X	CLARY, WARREN P. WATER HOLDING C JOURNAL OF SOIL	<b>d. ≠</b>	1969 F PLOOR LAYERS					
LARY, WARREN P.  INCREAS SAMPLING PRECISION POR HERBAGE VARIABLES THRU KNOWLEDGE TMBR OVERSTORY  JOURNAL OF RANGE MANAGEMENT 22(3):200-201  PAPER NO. 389	PAPER NO. 306	RANGE REHABILITATION	PONDEROSA PINE	ı	ı			
0-201 PONDEROSA PINE	CLARY, WARREN P. INCREAS SAMPLIN	G PRECISION FOR HERBAGE VARIABLI	1969 ES THRU KNOWLEDGE TMBR OVE	ERSTORY				
PONDEROSA PINE	JOURNAL OF RANG	E MANAGEMENT 22(3):200-201						
	PAPER NO. 389		PONDEROSA PINE	×			ı	ŧ

			POUNDS	INDUCED	CONVERSION TO NUMBER	INDUCED	
CITATION	PRACTICE	RANGE TYPE	FORAGE	OUTPUT	ANIMALS	ANIMALS	ECONOMICS
CLARY, WARREN P.	PEARSON, HENRY A.	1969	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				
CATTLE PREFERENCE	CATTLE PREFERENCES FOR FORAGE SPECIES IN NORTHERN ARIZONA IOHRAN OF PANCE MANAGEMENT 22(2):114-116	N ARIZONA					:
PAPER NO. 395		PINYON-JUNIPER	1	,	1	1	1
CLARY, WARREN P.							
EFFECTS OF UTAH .	EFFECTS OF UTAH JUNIPER REMOVAL ON HERBAGE YIELDS	S FROM SPRINGERVILLE SOILS	ILS				
JOURNAL OF RANGE PAPER NO. 305	JOURNAL OF RANGE MANAGEMENT 24(5):373-378 PAPER NO. 305 RANGE REHABILITATION	PINYON-JUNIPER	×	×	ı	t	1
CLARY, WARREN P.	MORRISON, DOUGLAS C.	1973					
LARGE ALLIGATOR .	LARGE ALLIGATOR JUNIPERS BENEFIT EARLY-SPRING FORAGE	RAGE					
JOURNAL OF RANGE	JOURNAL OF RANGE MANAGEMENT 26(1):70-71						
PAPER NO. 388	VEGETATIVE MGMT	PINYON-JUNIPER	×	*		ı	*
CLARY, WARREN P.		1974					
PINYON-JUNIPER C	PINYON-JUNIPER CONTROL - DOES IT PAY?						
18TH ANNUAL ARIZ	18TH ANNUAL ARIZONA WATERSHED SYMPOSIUM PROC:26-29	-29		:	;	>	c
PAPER NO. 309	RANGE REHABILITATION	PINYON-JUNIPER	×	×	×	× ,	) 19
CLARY, WARREN P.		1974					
RESPONSE OF HERB	RESPONSE OF HERBACEOUS VEGETATION TO FELLING OF	TO FELLING OF ALLIGATOR JUNIPER					
JOURNAL OF RANGE PAPER NO. 312	JOURNAL OF RANGE MANAGEMENT 27(5):387-389 PAPER NO. 312 RANGE REHABILITATION	PINYON-JUNIPER	×	×	×	×	

FORAGE MODEL - CITATIONS FOR REGIONS 1, 2, 3 AND 4

NOTTARTO	PRACTICE	RANGE TYPE	POUNDS	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
CLARY, WARREN P. ET EFFECTS OF PINYON-JUNIPER I USFS RM-128 RESEARCH PAPER PAPER NO. 316 RANG	ARY, WARREN P.  EFFECTS OF PINYON-JUNIPER REMOVAL ON NATURAL RESOURCE PRODUCTS & USES IN USFS RM-128 RESEARCH PAPER PAPER NO. 316  RANGE REHABILITATION PINYON-JUNIPER	1974 RESOURCE PRODUCTS & USES PINYON-JUNIPER	IN AZ	×	×	×	 B,C,B/C
CLARY, WARREN P. MULTIPLE USE EFFECTS OF MANIPULATING P WATERSHED MANAGEMENT SYMPOSIUM, LOGAN, PAPER NO. 307 RANGE REHABILITA	ARY, WARREN P. MULTIPLE USE EFFECTS OF MANIPULATING PINYON-JUNIPER WATERSHED MANAGEMENT SYMPOSIUM, LOGAN, UTAH PAPER NO. 307 RANGE REHABILITATION PI	1975 UNIPER PINYON-JUNIPER	, ×	×	×	×	В,С,В/С
CLARY, WARREN P.  CATTLE GRAZING & WOOD PRODUCTION WITH JOURNAL OF RANGE MANAGEMENT 28(6):434.  PAPER NO. 363		1975 DIFFERENT BASAL AREAS OF PONDEROSA PINE 437 PONDEROSA BUNCHGRASS X	ROSA PINE S X	×	×	×	, B,C,B/C
CLARY, WARREN P. RANGE MGMT & ITS ECOL BASIS USFS RM-158 RESEARCH PAPER PAPER NO. 404	1975 RANGE MGMT & ITS ECOL BASIS IN PONDEROSA PINE TYPE OF AZ: STATUS OF KNOWLEDGE USFS RM-158 RESEARCH PAPER PAPER NO. 404	1975 E TYPE OP AZ: STATUS OP PONDEROSA PINE	KNOWLEDGE X	×	•	·	O <b>.</b>
CLARY, WARREN P. FACTORS APPECTING FORAGE CONSUMPTION JOURNAL OF RANGE MANAGEMENT 31(1):9-1 PAPER NO. 394 MULTIPLE		1978 BY CATTLE IN AZ PONDEROSA PINE FORESTS .0 PONDEROSA PINE X	FORESTS	,	× ,		,

FORAGE MODEL - CITATIONS FOR REGIONS 1, 2, 3 AND 4

NCI E	PRACTICE	RANGE TYPE	POUNDS	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
CLARY, WARREN P. HERBAGE PRODUCTION	JAMESON, DONALD A.	ARY, WARREN P. JAMESON, DONALD A. 1981 HERBAGE PRODUCTION FOLLOWING TREE & SHRUB REMOVAL IN PINYON-JUNIPER TYPE	PE OF AZ	 			
JOURNAL OF RANGE MA PAPER NO. 311	JOURNAL OF RANGE MANAGEMENT 34(2):109-113 PAPER NO. 311 RANGE REHABILITATION	PINYON-JUNIPER	×	×	•	•	•
COUN FOR AGRIC SCI & TECH LIVESTOCK GRAZING ON PE JOURNAL OF RANGE MANAGEI PAPER NO. 410	DERAL LANDS IN MENT 27(3):174- ENERAL PAPER	1974 THE 11 WESTERN STATES 181	×		•	,	o .
CURRIE, PAT O. GRAZING MGMT OF PONDEROSA I USFS RM-159 RESEARCH PAPER PAPER NO. 401 MULT	RRIE, PAT O. GRAZING MGMT OP PONDEROSA PINE-BUNCHGRASS RANGES USFS RM-159 RESEARCH PAPER PAPER NO. 401 MULTIPLE	1975 ANGES OP CENTRAL ROCKY MOUNTAINS PONDEROSA-BUNCHGRASS X	NTAINS X	×	×		
CUSTER NATIONAL POREST POREST REPORT USFS REGION 1 PAPER NO. 693	EST POREST REPORT	1987	×	×			,
DAWSON, JEFFREY O. DINITROGEN-FIXING OR ST UNIV, COLLE PAPER NO. 362	WSON, JEFFREY O. DINITROGEN-FIXING PLANT SYMBIOSES FOR COMBINED OR ST UNIV, COLLEGE OF AGR SCI, SYMP SERIES 2. PAPER NO. 362 VEGETATIVE MGMT	1983 INED TIMBER AND LIVESTOCK PRODUCTION 5 2. TIMBER PRESS, BEAVERTON:95-112	PRODUCTION ON:95-112				,

			POUNDS	INDUCED	CONVERSION TO NURBER	INDUCED	
CITATION	PRACTICE	RANGE TYPE	PORAGE	OUTPUT	ANIMALS	ANIMALS	ECONOMICS
DUNFORD, E. G.	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1949					
RELATION OF GRAZING	RELATION OF GRAZING TO RUNOFF AND EROSION ON BUNCHGRASS RANGES	CHGRASS RANGES					
USPS RM-7 RESEARCH NOTES	NOTES						
PAPER NO. 423	GRAZING SYSTEM		ž	ı	•	è	ē
FFOLLIOTT, PETER F.	CLARY, WARREN P.	1974					
PREDICTING HERBAGE PROGRESSIVE AGRICUL	PREDICTING HERBAGE PRODUCTION FROM FOREST GROWTH IN ARIZONA PONDEROSA PINE PROGRESSIVE AGRICULTURE IN ARIZONA 26(3):3-5	IN ARIZONA PONDEROSA P	INE				
PAPER NO. 384	VEGETATIVE MGMT	PONDEROSA PINE	×	ż	·	,	,
FFOLLIOTT, PETER F. DIFP IN HERBAGE-TIM PROGRESSIVE AGRICUL	OLLIOTT, PETER F.  DIFF IN HERBAGE-TIMBER RELATION ON SEDIMENTARY & PROGRESSIVE AGRICULTURE IN ARIZONA 27(5):6-7	1975 & IGNEOUS SOILS IN AZ PONDEROSA	NDEROSA				
PAPER NO. 396		PONDEROSA PINE	×	1			i
FPOLLIOTT, PETER P.	ET AL	1977					
EPPECTS OF A PRESCRIBED P.	EPFECTS OF A PRESCRIBED PIRE IN AN ARIZONA PONDEROSA PINE FOREST USPS RM-336 RESEARCH NOTE	ROSA PINE FOREST					
PAPER NO. 320	RANGE REHABILITATION	PONDEROSA PINE	×	×		Ł	æ
PINK, DWAYNE H.		1973					
WATER HARVESTING POR IMPROVED GRAZING COPIES AVAILABLE UPON REQUEST	R IMPROVED GRAZING EFFICIENCY ON REQUEST						
PAPER NO. 369	WATER DEVELOPMENT	WESTERN RANGE	ł	ŧ			B, C

GARRETT, LAWRENCE D. MULTIRESOURCE RESEAR WORKSHOP ON WILDLIPE	PRACTICE	RANGE TYPE	POUNDS FORAGE	RESOURCE	TO NUMBER ANIMALS	NUMBER	ECONOMICS
PAPER NO. 525	RRETT, LAWRENCE D. MULTIRESOURCE RESEARCH & ITS IMPLICATIONS TO MGMT: WORKSHOP ON WILDLIPE & RANGE RES NEEDS IN N MEXICO PAPER NO. 525	1981 1981 MCMT: THE BEAVER CREEK BIOSPHERE MEXICO & SW US, RIO RICO AZ:40-44 PNYN-JNPR & PONDRSA X	PHERE 40-44		,		
GARY, HOWARD L.		1975					
WATERSHED MGMT PROBLEMS & USFS RM-139 RESEARCH PAPER PAPER NO. 725	OPPORTUNITIES FOR COLOR RAL WATERSHED MGMT	ADO PRONT RANGE PONDERO PONDEROSA PINE	SA PIN	,		,	ı
GIFFORD. GERALD P.	E A A L	1970					
INPILITRATION & EROSI JOURNAL OF RANGE MAN	s on PINYON-JUNIPER 3(6):402-406	SION SITES IN S.	UTAH				
PAPER NO. 308	RANGE REHABILITATION	PINYON-JUNIPER		ı	1	ı	
GIFFORD, GERALD F. RUNOFF & SEDIMENT YIELDS FROM RUNOFF JOURNAL OF RANGE MANAGEMENT 26(6):446	PLOTS	1973 ON CHAINED PINYON-JUNIPER SIT	SITE-UTAH				
PAPER NO. 325	z	PINYON-JUNIPER	,	ı	,	ı	,
GIFFORD, GERALD F. GRAZING SYSTEMS AND JOURNAL OF SOIL AND PAPER NO. 419	FFORD, GERALD P. HAWKINS, RICHARD H. 1976 GRAZING SYSTEMS AND WATERSHED MANAGEMENT: A LOOK AT THE JOURNAL OF SOIL AND WATER CONSERVATION 31(6):281-283 PAPER NO. 419 GRAZING SYSTEM VARIOUS	1976 AT THE RECORD 283 VARIOUS			,		,

SION EFECT ON WHITEHEAD. JOHN M. 1982 SION EFFECT ON PRODUCTIVITY IN RANGELAND ENVIRON; WHERE IS RESEARCH?  1322 RANGE REMABILITATION WESTERN RANGELANDS  1973 TER DEVELOPMENT: THE CHALLENGE - THE REWARD  1973 TER DEVELOPMENT: THE CHALLENGE - THE REWARD  1973 TER DEVELOPMENT: THE CHALLENGE - THE REWARD  1976  1976  1976  1976  1976  1976  1976  1976  1976  1976  1976  1976  1976  1976  1976  1976  1985  1989  1989  1989  1989  1989  1989  1981  1989	NOTATIO	PRACTICE	RANGE TYPE	POUNDS	INDUCED RESOURCE	CONVERSION TO NUMBER	INDUCED NUMBER ANIMALS	ON CO
WHITEREAD. JOHN M. 1982  ECT ON PRODUCTIVITY IN RANGELAND ENVIRON: WHERE IS RESEARCH?  MANAGEMENT 35(6):801-802  RANGE REHABILITATION WESTERN RANGELANDS						OT CHEST	S T C W T W C	ECONOMICS.
ET AL  ET AL  1973  LOPMENT: THE CHALLENGE - THE REWARD  UDON REQUEST  WATER BEVELOPMENT PLAINS GRASSLANDS  ET AL  1985  ANAGEMENT: TECHNICAL NOTE 366  RANGE REHABILITATION  1976  T AND CONTROL: THE STATUS OF OUR KNOWLEDGE  RANGE REHABILITATION  1983  & GULLIES IN OFF-ROAD VEHICLE TRAFIC AREAS  OF OFF-ROAD VEHICLE SIMPACTS & MCMT. ARID RECION: 245-264  RANGE REHABILITATION  DESERT	GIFFORD, GERALD F. SOIL EROSION EFFECT	WHITEHEAD, JOHN M.	1982 ENVIRON; WHERE IS RESE	ARCH?				
IDPMENT: THE CHALLENGE - THE REWARD UPON REQUEST WATER DEVELOPMENT PLAINS GRASSLANDS  ET AL I985 ANAGEMENT, TECHNICAL NOTE 366 RANGE REHABILITATION WEST RANGELAND  1976 TAND CONTROL: THE STATUS OF OUR KNOWLEDGE ARCH PAPER RANGE REHABILITATION 1983 4. CULLIES IN OFF-ROAD VEHICLE TRAFFIC AREAS OF OFF-ROAD VEHICLES-IMPACTS & MGMT, ARID REGION: 245-264 RANGE REHABILITATION DESERT	JOURNAL OF RANGE MAPPER NO. 322	NNAGEMENT 35(6):801-802 RANGE REHABILITATION	WESTERN RANGELANDS	•	,	•	,	1.4
LIOPMENT: THE CHALLENCE - THE REWARD UPON REQUEST WATER DEVELOPMENT PLAINS GRASSLANDS								
LOPMENT: THE CHALLENGE - THE REWARD UPON REQUEST WATER DEVELOPMENT PLAINS GRASSLANDS	GREENE, GEOPPREY E.		1973					
WATER DEVELOPMENT PLAINS GRASSLANDS	RANGE WATER DEVELOF	•	IRD					
ET AL 1985  ANAGEMENT, TECHNICAL NOTE 366  RANGE REHABILITATION WEST RANGELAND	COPIES AVAILABLE UF	ON REQUEST						
ANAGEMENT, TECHNICAL NOTE 366  RANGE REHABILITATION WEST RANGELAND	PAPER NO. 368	WATER DEVELOPMENT	PLAINS GRASSLANDS	,				æ
ANGE REHABILITATION WEST RANCELAND	HARVEY, MICHAEL D.	ET AL	1985					
AND CONTROL: THE STATUS OF OUR KNOWLEDGE  ARCH PAPER  RANGE REHABILITATION  1976  TAND CONTROL: THE STATUS OF OUR KNOWLEDGE  RANGE REHABILITATION  1983  4. GULLIES IN OFF-ROAD VEHICLE TRAFFIC AREAS  OF OFF-ROAD VEHICLES-IMPACTS & MGMT, ARID REGION: 245-264  RANGE REHABILITATION  DESERT	GULLY EROSION							
T AND CONTROL: THE STATUS OF OUR KNOWLEDGE  ARCH PAPER RANGE REHABILITATION  4. GULLIES IN OPP-ROAD VEHICLE TRAFFIC AREAS  OF OPF-ROAD VEHICLES-IMPACTS & MGMT, ARID REGION: 245-264  RANGE REHABILITATION  DESERT	BUREAU OF LAND MANA	_						
T AND CONTROL: THE STATUS OF OUR KNOWLEDGE  ARCH PAPER  RANGE REHABILITATION  1983  4. GULLIES IN OFF-ROAD VEHICLE TRAFFIC AREAS  OF OFF-ROAD VEHICLES-IMPACTS 6. MGMT, ARID REGION: 245-264  RANGE REHABILITATION  DESERT	PAPER NO. 303	RANGE REHABILITATION	WEST RANGELAND	ł	,	•	,	•
T AND CONTROL: THE STATUS OF OUR KNOWLEDGE  ARCH PAPER  RANGE REHABILITATION  1983  4. GULLIES IN OFF-ROAD VEHICLE TRAFFIC AREAS  OF OFF-ROAD VEHICLES-IMPACTS 8. MGMT, ARID REGION: 245-264  RANGE REHABILITATION DESERT								
T AND CONTROL: THE STATUS OF OUR KNOWLEDGE  ARCH PAPER  RANGE REHABILITATION  1983  4. GULLIES IN OFF-ROAD VEHICLE TRAFFIC AREAS  OF OFF-ROAD VEHICLES-IMPACTS 8. MGMT, ARID REGION: 245-264  RANGE REHABILITATION DESERT	HEEDE, BURCHARD H.		1976					
ARCH PAPER  RANGE REHABILITATION  1983  4. GULLIES IN OFF-ROAD VEHICLE TRAFFIC AREAS  OF OFF-ROAD VEHICLES-IMPACTS 8. MGMT, ARID REGION: 245-264  RANGE REHABILITATION DESERT	GULLY DEVELOPMENT A	IND CONTROL: THE STATUS OF OUR	KNOWLEDGE					
### RANGE REHABILITATION  1983  ###################################	USFS RM-169 RESEARC	H PAPER						
1983 & GULLIES IN OPP-ROAD VEHICLE TRAFFIC AREAS OP OFF-ROAD VEHICLES-IMPACTS & MGMT, ARID REGION:245-264 RANGE REHABILITATION DESERT	PAPER NO. 302	RANGE REHABILITATION		,		,		B, C, B/C
1983 & GULLIES IN OPP-ROAD VEHICLE TRAFFIC AREAS OP OFF-ROAD VEHICLES-IMPACTS & MGMT, ARID REGION:245-264 RANGE REHABILITATION DESERT								
510N:245-264	HEEDE, BURCHARD H.		1983					
MPACTS & MGMT, ARID REGION:245-264 TION DESERT	CONTROL OF RILLS &	GULLIES IN OPP-ROAD VEHICLE TI	AFFIC AREAS					
HANGE KEHABILITATION DESERT	ENVIRON EFFECTS OF	MPACTS &	MT, ARID REGION:245-26	7				1
	PAPER NO. 301	RANGE REHABILITATION	DESERT	•	ı	•	•	ည. က

CITATION	PRACTICE	RANGE TYPE	POUNDS	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
HIBBERT, ALDEN R. ET CHAPARRAL CONVERSION POTENT	BBERT, ALDEN R. ET AL CHAPARRAL CONVERSION POTENTIAL IN AZ, PART	1974 I: WATER YIELD RESPONSE &	EFFECTS				
PAPER NO. 520	VEGETATIVE MGMT	CHAPARRAL	×	•	ı		; ·
HIBBERT, ALDEN R. WATER YIELD IMPRO	BBERT, ALDEN R. WATER YIELD IMPROVEMENT POTENTIAL BY VEGE	1983 VEGETATION MGMT ON WESTERN RANGELANDS	ELANDS				
WATER RESOURCES B PAPER NO. 511		,	,		r		B, C
HIBBERT, ALDEN R. OPPORTUNITIES TO INCREA USFS RM, TEMPE, ARIZONA	SE WATER YLD IN	UNKWN THE SOUTHWEST BY VEGETATION MANAGEMENT	ANAGEMENT				
PAPER NO. 514	VEGETATIVE MGMT	VARIOUS	ı	•	•	1	
JAMESON, DONALD A. HERBAGE PRODUCTION DIFFERS USFS RM-131 RESEASRCH NOTE	DD, J. D. WITH SOIL	1969 IN THE PINYON-JUNIPER TYPE OF ARIZONA	RIZONA				
PAPER NO. 386	t	PINYON-JUNIPER	×	t			t
JOYCE, LINDA A. RANGE FORAGE DATA USFS RM-133 GENER	YCE, LINDA A.  FT AL  RANGE FORAGE DATA BASE FOR 20 GREAT PLAINS, USFS RM-133 GENERAL TECHNICAL REPORT	SOUTH					
PAPER NO. 390		ALL	×	•	×		1

CITATION	PRACTICE	RANGE TYPE	POUNDS	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
KLEMMEDSON, J. O. LONG-TERM EFFECT OP N SOIL SCIENCE SOCIETY PAPER NO. 314	EMMEDSON, J. O. TIEDEMANN, A. R. 1986 LONG-TERM EFFECT OP MESQUITE REMOVAL ON SOIL CHARAC: II. NUTRIENT AVAILABILITY SOIL SCIENCE SOCIETY OF AMERICAN JOURNAL 50:476-480 PAPER NO. 314 RANGE REHABILITATION DESERT GRASSLAND	1986 IRAC: II. NUTRIENT AVAILA 480 DESERT GRASSLAND	ABILITY	,	,	,	: 1
KLIPPLE, GRAYDON E. EARLY/LATE-SEASON GRAZ VS SEASON-LONG USPS RM-11 RESEARCH PAPER PAPER NO. 422 GRAZING SYSTEM	SEASON-LONG	1964 GRAZ OP SHORT-GRASS VEG CTRL GRT PLAINS SHORT-GRASS	PLAINS			×	
LEAF, CHARLES P. WATERSHED MGMT IN CENTRAL (USPS RM-142 RESEARCH PAPER PAPER NO. 723	WATERSHED MGMT IN CENTRAL & SOUTHERN ROCKY MTNS: USPS RM-142 RESEARCH PAPER PAPER NO. 723 GENERAL WATERSHED MGMT	1975 SUMMARY OF STATUS OF KNOWLEDG SAGEBRUSH	NOWLEDG				
LEAP, CHARLES F. WATERSHED MANAGEMENT IN ROCKY MOUNTAIN USFS RM-137 RESEARCH PAPER PAPER NO. 726 GENERAL WATERSHE	a	1975 SUBALPINE ZONE: STATUS OF OUR KNOWLEDGE MGMT SUBALPINE	OWLEDGE				,
LINCOLN NATIONAL FOREST - AGUA CHIQUITA ALLOTMENT MANAGEMENT PLA USFS REGION 3 PAPER NO. 699 GRAZING SYSTEM	SNT MANAGEMENT PLAN GRAZING SYSTEM	1985					в, с

CITATION	PRACTICE	RANGE TYPE	POUNDS	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
MARTIN, S. CLARK EVALUATING IMPACT CATTLE GRAZING ON FORUM - GRAZING & RIPARIAN/STREAM EC PAPER NO. 631 RANGE MANAGEMI	1 () (i)	1978 RIPARIAN HABITATS IN NATL FORESTS OF AZ/NM OSYSTEMS PROC, TROUT UNLIMITED (PUB):35-38 NT RIPARIAN	F AZ/NM				
MCGINNIES, WILLIAM J. NICHOLAS, PA EFFECTS OF TOPSOIL THICKNESS/NITROGE JOURNAL OF ENVIRONMENTAL QUALITY 9(4	NICHOLAS, PA THICKNESS/NITROGE ENTAL QUALITY 9(4	ULA J. 1980  N PERTILIZER ON REVEGETATION OF COAL MINE ):681-686	L MINE				
PAPER NO. 324	RANGE REHABILITATION	SAGEBRUSH	×	×	,	ŧ	ı
NATIONAL RESEARCH COUNCIL NAT'L ACADEM ECONOMIC PEASIBILITY AND PUBLIC RANG DEVELOPING STRATEGIES POR RANGELAND PAPER NO. 375 GENERAL PAPER	NATIONAL RESEARCH COUNCIL NAT'L ACADEMY OF SCIENCES ECONOMIC PEASIBILITY AND PUBLIC RANGE INVESTMENT DEVELOPING STRATEGIES POR RANGELAND MGMT, WESTVIEV PAPER NO. 375 GENERAL PAPER	IY OF SCIENCES 1984 SE INVESTMENT MGMT, WESTVIEW PRESS, BOULDER, CO, 1984 ALL	1984 x	×	×	×	B,C,B/C,IRR
NIELSEN, DARWIN B. ESTIMATING THE ECONOMIC VALUE OF THE COMMITTEE ON ECON OF RNG USE & DEVEL PAPER NO. 374 GENERAL PAPER	0	1964 RANGE RESOURCE PROM LIVESTOCK PRODUCTION OP OF WAGRIC ECON RESEARCH COUNCIL, RPT 6	UCTION RPT 6	×	×	×	B, C
NIELSEN, DARWIN B. RURAL/REGIONAL ECON PROC OF WORKSHOP ON PAPER NO. 378	ELSEN, DARWIN B.  RURAL/REGIONAL ECON ASPECTS OF LIVESTOCK & WILDLIFE/FISHERIES USE OF W. RNGLDS PROC OF WORKSHOP ON LIVESTOCK/WILDLIFE-FISH RELATIONSHIPS IN GREAT BASIN:19-24 PAPER NO. 378  GENERAL PAPER	1977 LIFE/FISHERIES USE OF W. ATIONSHIPS IN GREAT BASIN WESTERN RANGELAND	RNGLDS N: 19-24	,	,	,	n c

CITATION	PRACTICE	P RANGE TYPE	POUNDS	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
OSWALD, BRIAN P. COVINGTON, W. EFFECT OF PRESCRIBED FIRE ON HERBAGE FOREST SCIENCE 30(1):22-25	WALLACE PRODUCT IN	1984 SW PONDEROSA ON SEDIMENT	SOILS				
PAPER NO. 321	RANGE REHABILITATION	PONDEROSA PINE	×	×		ı	
PACKER, PAUL E.  EPPECTS OF TRAMPLING DISTURBANCE ON JOURNAL OF FOREST SCIENCE 1(1):28-31 PAPER NO. 421 GENERAL PAPER	1953 DISTURBANCE ON WATERSHED CONDITION, IENCE 1(1):28-31 GENERAL PAPER	1953 DNDITION, RUNOFF, AND EROSION	NOIS	,		,	
PASE, CHARLES P. COMPOSITION, PRODUCTION & USFS RM-103 RESEARCH NOTE	SE, CHARLES P. THILENIUS, JOHN F. 1968 COMPOSITION, PRODUCTION & SITE FACTORS OF SOME GRASSLANDS IN BLACK HILLS OF USFS RM-103 RESEARCH NOTE	1968 RASSLANDS IN BLACK HILLS	OF SD				,
PAPER NO. 398	GENERAL	PLAINS GRASSLANDS	×	×	,	ı	,
PAULSEN, HAROLD A., JR. RANGE MGMT IN CENTRAL & SOUTHERN ROCKY USFS RM-154 RESEARCH PAPER	. L & SOUTHERN ROCKY MTNS: SUMMARY OF PAPER	1975 IMARY OF STATUS OF KNOWLEDGE	)GE				
PAPER NO. 403	MULTIPLE	VARIOUS	×	×	×	1	D, C
PEARSON, H. A. EFFECTS OF WILDFIRE ( JOURNAL OF RANGE MAN.	ARSON, H. A. ET AL 1972 EFFECTS OF WILDFIRE ON TIMBER & FORAGE PRODUCTION IN ARIZONA JOURNAL OF RANGE MANAGEMENT 25(4):250-253	1972 DN IN ARIZONA		0			
PAPER NO. 80	RANGE REHABILITATION	PONDEROSA PINE	×	×		,	ł

				INDUCED	CONVERSION	INDUCED	
			POUNDS	RESOURCE	TO NUMBER	NUMBER	
CITATION	PRACTICE	RANGE TYPE	FORAGE	OUTPUT	ANIMALS	ANIMALS	ECONOMICS
PEARSON, HENRY A.	ARSON, HENRY A. JAMESON, DONALD A.	LD A. 1967 PRODICTION ON PONDEROSA PINE RANGE	39			1 1 1 1 1 1 1 1	, , , , , , , , , , , , , ,
USFS RM, HANDOUT PAPER NO. 366	USFS RM, HANDOUT FOR PIELD TRIPS; NOT A PUBLICATION PAPER NO. 366 VEGETATIVE MGMT PO	TION PONDEROSA PINE		•	,	ı	
PEARSON, HENRY A.		1971					
ESTIM CATTLE GAIN JOURNAL OF RANGE	ESTIM CATTLE GAINS PROM CONSUMPTION OF DIGESTIBI JOURNAL OF RANGE MANAGEMENT 25(1):18-20	OP DIGESTIBLE FORAGE ON PONDEROSA PINE RNG 3-20	PINE RNG				
PAPER NO. 392		PONDEROSA PINE	×		×	ı	•
PFARCON HFURN		1073					
CALCULATING GRAZI	CALCULATING GRAZING INTENSITY FOR MAX PROPIT ON PONDEROSA PINE RANGE IN N.	PONDEROSA PINE RANGE	IN N. AZ				
JOURNAL OF RANGE	JOURNAL OF RANGE MANAGEMENT 26(4):277-278						
PAPER NO. 373	GRAZING SYSTEM	PONDEROSA PINE	×	×	×	×	D, C
RAUZI, FRANK	HANSON, CLAYTON L.	1966					
WATER INTAKE AND	WATER INTAKE AND RUNOPP AS AFFECTED BY INTENSITY OF GRAZING	OF GRAZING					
JOURNAL OF RANGE	JOURNAL OF RANGE MANAGEMENT 19(6):351-356						
PAPER NO. 535	GRAZING	MIXED PRAIRIE					•
REYNOLDS, HUDSON G.	ET AL	0261					
GAMBEL OAK FOR SC JOURNAL OF FOREST	GAMBEL OAK FOR SOUTHWESTERN WILDLIFE JOURNAL OP FORESTRY (SEPT 1970):545-547						
PAPER NO. 346		PONDEROSA PINE	×	×	ŧ	,	ŧ

			POUNDS	INDUCED	CONVERSION TO NUMBER	INDUCED	
CITATION	PRACTICE	RANGE TYPE	FORAGE	OUTPUT	ANIMALS	ANIMALS	ECONOMICS
RICH, LOWELL R. GRAZING IN RELATI JOURNAL OF RANGE	CH, LOWELL R.  GRAZING IN RELATION TO RUNOPP & EROSION ON SOME CHAPARRAL WATERSHEDS OP JOURNAL OP RANGE MANAGEMENT 16(6):322-326	1963 CHAPARRAL WATERSHEDS OP	CTR AZ				
PAPER NO. 417	GRAZING SYSTEM	CHAPARRAL			ı	ı	œ.
RIITTERS, KURT	ET AL	1982					
DYNAMIC PROGRAMMING OPTIMIZA' POREST SCIENCE 28(3):517-526	DYNAMIC PROGRAMMING OPTIMIZATION TIMBER PRODUCTION POREST SCIENCE 28(3):517-526	ON & GRAZING IN PONDEROSA PINE	SA PINE				
PAPER NO. 100	VEGETATIVE MANAGEMENT	PONDEROSA PINE	×	×	×	×	B, C
SAWTOOTH NATIONAL POREST	OREST	1986					
STANLEY BASIN ANA	STANLEY BASIN ANALYSIS, SAWTOOTH NATIONAL RECREATION AREA	TION AREA					
COSTS SAWLOOIN NALLONAL FOREST	TOWAL FORESI	ł	,	,	ě	,	
PAPER NO. 714	HABITAT IMPROVEMENT		,	,	ı	•	B, C, B/C
SCHMIDT, WYMAN C.		1979					
UNDERSTORY VEGETA	UNDERSTORY VEGETATION RESPONSE TO HARVEST & RESIDUE MGMT IN LARCH/FIR POREST	DUE MGMT IN LARCH/PIR PC	OREST				
USFS INT-90 GENER	USPS INT-90 GENERAL TECHNICAL REPORT: 221-246						
PAPER NO. 357	VEGETATIVE MGMT	LARCH/DOUGLAS PIR	×	•			•
SHARP, A. J.	EL AL	1964					
RUNOFP AS APFECTE	RUNOFP AS APFECTED BY INTENSITY OF GRAZING ON RANGELAND	NGELAND					
JOURNAL OF SOIL A	JOURNAL OF SOIL AND WATER CONSERVATION 19:103-106	9					
PAPER NO. 408	GRAZING SYSTEM	•	×	×	×	•	,

FORAGE MODEL - CITATIONS FOR REGIONS 1, 2, 3 AND 4

			POUNDS	INDUCED	CONVERSION TO NUMBER	INDUCED	
CITATION	PRACTICE	RANGE TYPE	FORAGE	OUTPUT	ANIMALS	ANIMALS	ECONOMICS
SMITH, DWIGHT R. EFFECTS OF CATTL	ITH, DWIGHT R. EFFECTS OF CATTLE GRAZING ON A PONDEROSA P	1967 ROSA PINE-BUNCHGRASS RANGE IN COI	COLORADO	,   	1 1 1 1 1 1 1 1 1	 	
USFS TECHNICAL BULLETIN 1371 PAPER NO. 412 GRAZIN	ULLETIN 1371 GRAZING SYSTEM	PONDEROSA-BUNCHGRASS	, S	•		•	
SPRINGFIELD, H. W. CHARACTERISTICS	& MGMT OP SW PINYON-	1976 JUNIPER RANGES: STATUS OF OUR KNOWLEDGE	OWLEDGE				
USFS RM-160 RESEARCH PAPER PAPER NO. 399 MULT	ARCH PAPER MULTIPLE	PINYON-JUNIPER	×	×		ŧ	В, С
STURGES, DAVID L.		1975					
HYDRO RELATION ON UNDISTURI USFS RM-140 RESEARCH PAPER	B/CONVERT	BIG SAGEBRUSH LANDS: STATUS OF KNOWLEDGE	NOWLEDGE				
PAPER NO. 315	RANGE REHABILITATION	SAGEBRUSH	×	×			ı
THILL, RONALD E.	ET AL	1983					
DEER AND ELK FORAGE PRODUCT USFS RM-248 RESEARCH PAPER	DEER AND ELK FORAGE PRODUCTION IN ARIZONA MIXED CONIFER FORESTS USFS RM-248 RESEARCH PAPER	MIXED CONIFER FORESTS					
PAPER NO. 350	VEGETATIVE MGMT	•	×	×			<b>s</b>
THOMAS, JACK WARD	ET AL	1978					
RIPARIAN ZONES FORUM: GRAZING	RIPARIAN ZONES IN MANAGED RANGELANDS-THEIR IMPORTANCE TO WILDLIFE FORUM: GRAZING & RIPARIAN/STREAM ECOSYSTEMS, MARCH 1979, TROUT UN	IMPORTANCE TO WILDLIFE S, MARCH 1979, TROUT UNLIMITED:21-31	ITED:21-31				
PAPER NO. 407	GRAZING SYSTEM	RIPARIAN ZONE				,	,

			POUNDS	INDUCED	CONVERSION TO NUMBER	INDUCED	
CITATION	PRACTICE	RANGE TYPE	FORAGE	OUTPUT	ANIMALS	ANIMALS	ECONOMICS
TIEDEMANN, A. R. KLEMMEDSON, LONG-TERM EPPECT OF MESQUITE REMOVAL SOIL SCIENCE SOCIETY OF AMERICAN JOU	EDEMANN, A. R. KLEMMEDSON, J. O. LONG-TERM EPPECT OF MESQUITE REMOVAL ON SOIL CHARAC: I SOIL SCIENCE SOCIETY OF AMERICAN JOURNAL 50(2):472-475	J. O. 1986 ON SOIL CHARAC: I. NUTRIENTS/BULK DENSITY RNAL 50(2):472-475	DENSITY				
PAPER NO. 313	RANGE REHABILITATION	DESERT GRASSLAND	•				ı
TURNER, GEORGE T. PAULSEN, HARMMANACEMENT OF MOLINTAIN GRASSLANDS IN		OLD A., JR. 1976 CENTRAL ROCKIES: STATUS OF OUR KNOWLEDGE	OWLEDGE				
USPS RM-161 RESEARCH PAPER							
PAPER NO. 400	MULTIPLE	MOUNTAIN GRASSLAND	×		×	1	ပ <b>်</b>
USDA SCS							
SANDIA MOUNTAINS TRIBUTARIES OF THE USFS REGION 3		RIO GRANDE WATERSHED, SANDOVAL COUNTY, NM	NTY. NM				
PAPER NO. 701	FLOOD CONTROL						o, w
VALENTINE, K. A.		1947					
DISTANCE PROM WATER	DISTANCE PROM WATER AS A FACTOR IN GRAZING CAPACITY OF RANGELAND	PACITY OF RANGELAND					
JOURNAL OF PORESTRY 45(10):749-754 PAPER NO. 371 WATER DEVELO	45(10):749-754 WATER DEVELOPMENT	•	×	×	×	×	•
VAN DERSAL, WILLIAM R.	_	UNKWN					
THE DEPENDENCE OF S  2ND NORTH AMERICAN DARDED NO 240	THE DEPENDENCE OF SOILS ON ANIMAL LIFE  2ND NORTH AMERICAN WILDLIFE CONP: 458-467	,	,			,	
raren no. 340							

FORAGE MODEL - CITATIONS FOR REGIONS 1, 2, 3 AND  $\boldsymbol{4}$ 

ON INDUCED R NUMBER ANIMALS ECONOMICS	B.C.B/C.IRR
INDUCED NUMBER ANIMALS	×
CONVERSION TO NUMBER ANIMALS	×
INDUCED RESOURCE OUTPUT	×
POUNDS	RANGELANDS
INDUCED POUNDS RESOURCE RANGE TYPE PORAGE OUTPUT	DISTRIBUTION PRACTICES ON MTN RANGELANDS 304 MOUNTAIN RANGELAND X
CITATION PRACTICE	ω
CITATION	WORKMAN, JOHN P. PRELIMINARY ECON JOURNAL OF RANGE PAPER NO. 372

Ø	:				
ECONOMICS	,		•	,	в, с
INDUCED NUMBER ANIMALS	,				
CONVERSION TO NUMBER ANIMALS	,				
INDUCED RESOURCE OUTPUT	,			3	
POUNDS	,	R SUPPLY	CD CHARAC	1:297-307 W	×
RANGE TYPE	LAN, J. R.  MAINTAINING WATER QUALITY THROUGH CONTROL OF AQUATIC VEGETATION COPIES AVAILABLE UPON REQUEST PAPER NO. 370  WATER DEVELOPMENT	1986 ON FLOODS, SEDIMENTATION & WATER SUPPLY D MGMT -	1984 IMPACTS OF GRAZING INTENSITY & SPECIALIZED GRAZING SYSTEMS ON WATERSHED CHARAC DEVELOPING STRATEGIES FOR RANGELAND MANAGEMENT, WESTVIEW PRESS, BOULDER, CO PAPER NO. 411 GRAZING SYSTEM VARIOUS	1983 ITS IES 2. TIMBER PRESS, BEAVERTON:297-307 DOUGLAS-FIR	1974 THE 11 WESTERN STATES 181
PRACTICE	SMOLIAK, S. R QUALITY THROUGH CONTRC UPON REQUEST WATER DEVELOPMENT	DERSON, HENRY W. ET AL PORESTS & WATER: EPPECT OF POREST MGMT ( USFS PSW-18 GENERAL TECHNICAL REPORT PAPER NO. 719 GENERAL WATERSHED	H. NG INTENSITY & SPECIALIZ EGIES FOR RANGELAND MANA GRAZING SYSTEM	EARY, DELBERT V. PORAGE FOR WILDLIPE: GRASSLAND AND FORESTS OR ST UNIV, COLLEGE OF AGR SCI, SYMP SERIES PAPER NO. 342	DERAL LANDS IN MENT 27(3):174- ENERAL PAPER
CITATION	ALLAN, J. R. SMOLII MAINTAINING WATER QUALITY THR COPIES AVAILABLE UPON REQUEST PAPER NO. 370 WATER D	ANDERSON, HENRY W. PORESTS & WATER: USFS PSW-18 GENER PAPER NO. 719	BLACKBURN, WILBERT H. IMPACTS OF GRAZING DEVELOPING STRATEGI PAPER NO. 411	CLEARY, DELBERT V. PORAGE FOR WILDLI OR ST UNIV, COLLE PAPER NO. 342	COUN FOR AGRIC SCI & TECH LIVESTOCK GRAZING ON FEI JOURNAL OF RANGE MANAGE! PAPER NO. 410

			o di Nilo	INDUCED	CONVERSION	INDUCED	
CITATION	PRACTICE	RANGE TYPE	FORAGE	OUTPUT	ANIMALS	ANIMALS	ECONOMICS
DAWSON, JEFFREY O.  DINITROGEN-FIXING PLANT SYMBIOSES F  OR ST UNIV, COLLEGE OP AGR SCI, SYM  PAPER NO. 362  VEGETATIVE MG	OR COMBINED P SERIES 2.	1983 TIMBER AND LIVESTOCK PRODUCTION TIMBER PRESS, BEAVERTON:95-112	0UCT10N 95-112	,	,	,	,
GIFFORD, GERALD F. GRAZING SYSTEMS AND JOURNAL OF SOIL AND PAPER NO. 419	FFORD, GERALD F. HAWKINS, RICHARD H. 1976 GRAZING SYSTEMS AND WATERSHED MANAGEMENT: A LOOK AT THE RECORD JOURNAL OF SOIL AND WATER CONSERVATION 31(6):281-283 PAPER NO. 419 GRAZING SYSTEM	1976 AT THE RECORD 283 VARIOUS		,		1	
GIFFORD, GERALD F. SOIL EROSION EFFECT ON PRODUCTIVITY JOURNAL OF RANGE MANAGEMENT 35(6):8 PAPER NO. 322 RANGE REHABIL	FFORD, GERALD F. WHITEHEAD, JOHN M. 1982 SOIL EROSION EFPECT ON PRODUCTIVITY IN RANGELAND ENVIRON; WHERE IS RESEARCH? JOURNAL OF RANGE MANAGEMENT 35(6):801-802 PAPER NO. 322 RANGE REHABILITATION WESTERN RANGELANDS .	1982 ENVIRON; WHERE IS RESEA WESTERN RANGELANDS	ARCH?		•	•	
HALL, FREDERICK C. APPLICATION AND INTERPRETATION OP F FORESTLAND GRAZING, SYMPOSIUM PROC, PAPER NO. 361 GENERAL PAPER	F - E	1983 FOREST ECOSYSTEMS CLASSIFICATION C, WASHINGTON STATE UNIV EXTENSION SVC:7-14 RR	.7-14 x				
JACKSON, T. L. SOIL FERTILITY AFFEC OR ST UNIV, COLLEGE PAPER NO. 331	CKSON, T. L. SOIL FERTILITY AFFECTS PORAGE PRODUCTION IN WESTE OR ST UNIV, COLLEGE OF AGR SCI, SYMP SERIES 2. TI PAPER NO. 331 RANGE REHABILITATION	1983 WESTERN OREGON 2. TIMBER PHESS, BEAVERTON:65-72 DOUGLAS-FIR	55-72 x	×		,	

SOI	1 1 1 1 1				
ECONOMICS		r	·	,	
INDUCED NUMBER ANIMALS			ı	×	,
CONVERSION TO NUMBER ANIMALS	×	,	,	×	×
INDUCED RESOURCE OUTPUT	,	,	•	×	
POUNDS	A T E S	GRASSLANDS	,	ON:175-183	SVC:15-18 x
RANGE TYPE	1986 PLAINS, SOUTHERN, AND WESTERN STATES ALL	1962 OP GRAZING IN CALIFORNIA WINTER GRASSLANDS	1986 HINDRANCE AND HELP	1983 EST RANGES SERIES 2. TIMBER PRESS, BEAVERTON:175-183 FORESTED RANGE	1983 DOUGLAS-FIR-PINEGRASS REGION WASHINGTON STATE UNIV EXTENSION SVC:15-18 DOUGLAS-FIR
PRACTICE	YCE, LINDA A. ET AL RANGE FORAGE DATA BASE POR 20 GREAT PLAUSFS RM-133 GENERAL TECHNICAL REPORT PAPER NO. 390	FLUENCED BY DEGREE Management 15:34-42 Grazing system	DONALD, PHILIP M. GRASSES IN YOUNG CONIFER PLANTATIONS - NORTHWEST SCIENCE 60(4):271-278 PAPER NO. 367 VEGETATIVE MGMT	LEAN, ALASTAIR PRODUCING FORAGE FOR LIVESTOCK ON POREST RANGES OR ST UNIV, COLLEGE OP AGR SCI, SYMP SERIES 2. PAPER NO. 382 VEGETATIVE MGMT	LEAN, ALASTAIR CLASSIFICATION AND MANAGEMENT OF THE DC FORESTLAND GRAZING, SYMPOSIUM PROC, WAS PAPER NO. 397
CITATION	JOYCE, LINDA A. RANGE FORAGE DAT USFS RM-133 GENE PAPER NO. 390	LIACOS, LEONIDAS G. WATER YIELD AS IN JOURNAL OF RANGE PAPER NO. 415	MCDONALD, PHILIP M. GRASSES IN YOUNG CONIFER PLANTA NORTHWEST SCIENCE 60(4):271-278 PAPER NO. 367 VEGETATIV	MCLEAN, ALASTAIR PRODUCING FORAGE OR ST UNIV, COLL PAPER NO. 382	MCLEAN, ALASTAIR CLASSIFICATION A FORESTLAND GRAZII

CITATION	PRACTICE	RANGE TYPE	POUNDS	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
MOSHER, WAYNE SEEDBED PREPARATION OR ST UNIV, COLLEG PAPER NO. 332	SHER, WAYNE BEDELL, THOMAS SEEDBED PREPARATION AND ESTABLISHMENT OF PORAGE OR ST UNIV, COLLEGE OP AGR SCI, SYMP SERIES 2. T PAPER NO. 332 RANGE REHABILITATION	1983 SPECIES IN OREGON TIMBER PRESS, BEAVERTON:51-63 DOUGLAS-FIR	51-63				1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
NATIONAL RESEARCH COUNCIL NAT'L ACADEM ECONOMIC FEASIBILITY AND PUBLIC RANG DEVELOPING STRATEGIES FOR RANGELAND	NATIONAL RESEARCH COUNCIL NAT'L ACADEMY OP SCIENCES 1984 ECONOMIC FEASIBILITY AND PUBLIC RANGE INVESTMENT DEVELOPING STRATEGIES FOR RANGELAND MGMT, WESTVIEW PRESS,	ES 1984 T IEW PRESS, BOULDER, CO, 1984	1984	,	2	,	
PAPER NO. 375 NIELSEN, DARWIN B.	GENERAL PAPER	ALL 1964	×	×	×	×	B, C, B/C, IRR
ESTIMATING THE ECONOMIC VALUE OP THE COMMITTEE ON ECON OP RNG USE & DEVEL PAPER NO. 374 GENERAL PAPER	. 0	RANGE RESOURCE FROM LIVESTOCK PRODUCTION P OF WAGRIC ECON RESEARCH COUNCIL, RPT 6 X	UCTION RPT 6 X	×	*	×	D, G
NIELSEN, DARWIN B. GODFREY, E. RURAL/REGIONAL ECON ASPECTS OP LIVES PROC OP WORKSHOP ON LIVESTOCK/WILDLI	ELSEN, DARWIN B. GODFREY, E. BRUCE 1977 RURAL/REGIONAL ECON ASPECTS OP LIVESTOCK & WILDLIFE/FISHERIES USE OF W. RNGLDS PROC OP WORKSHOP ON LIVESTOCK/WILDLIFE-PISH RELATIONSHIPS IN GREAT BASIN:19-24	BRUCE TOCK & WILDLIFE/FISHERIES USE OF W. RNGLDS FE-PISH RELATIONSHIPS IN GREAT BASIN:19-24	RNGLDS N:19-24				
PAPER NO. 378	GENERAL PAPER	WESTERN RANGELAND				•	в, с
RAGUSE, C. A.  PLANT, LIVESTOCK & ECONOMIC RESPONSE  34TH ANNUAL CALIFORNIA PERTILIZER CO PAPER NO. 330  RANGE REHABILI	GUSE, C. A. PLANT, LIVESTOCK & ECONOMIC RESPONSES TO SELECTIV 34TH ANNUAL CALIFORNIA PERTILIZER CONF PROC:53-61 PAPER NO. 330 RANGE REHABILITATION	1986 S TO SELECTIVE FERTIL OF ANNUAL RANGELAND NF PROC:53-61 TATION OAK-PINE X	GELAND X	,	×	×	B, C

CITATION	PRACTICE	RANGE TYPE	POUNDS	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
SCHULTZ, BOB POCO CREEK RESTORATION PROJ USFS PLUMAS NATIONAL POREST PAPER NO. 715 HABIT	MAS NATIONA ECT: BECKWO	IT 1987	,	,	,		B, C, B/C
THOMAS, JACK WARD RIPARIAN ZONES IN M. PORUM: GRAZING & RII PAPER NO. 407	OMAS, JACK WARD ET AL RIPARIAN ZONES IN MANAGED RANGELANDS-THEIR IMPORTANCE TO WILDLIFE PORUM: GRAZING & RIPARIAN/STREAM ECOSYSTEMS, MARCH 1979, TROUT UNLIMITED:21-31 PAPER NO. 407 GRAZING SYSTEM	1978 IPORTANCE TO WILDLIFE MARCH 1979, TROUT UNLIMIT RIPARIAN ZONE	red:21-31		,	,	
VAN DERSAL, WILLIAM R. THE DEPENDENCE OP SOILS ON ANIMAL LIFE 2ND NORTH AMERICAN WILDLIFE CONP:458-4 PAPER NO: 340	N DERSAL, WILLIAM R. THE DEPENDENCE OP SOILS ON ANIMAL LIFE 2ND NORTH AMERICAN WILDLIPE CONP: 458-467 PAPER NO. 340	UNKEN.				,	
VAVRA, MARTIN MANAGING GRAZING AN FORESTLAND GRAZING, PAPER NO. 393	URA, MARTIN MANAGING GRAZING ANIMAL RESPONSE TO FORESTLAND VEGETATION FORESTLAND GRAZING, SYMPOSIUM PROC, SPOKANE, WASHINGTON:43-51 PAPER NO. 393 VEGETATIVE MGMT	1983 ID VEGETATION WASHINGTON:43-51	×	×	×	×	,
WILLIAMS, KING FOREST GRAZING: A RANCHER'S VIEWPOINT, FORESTLAND GRAZING, SYMPOSIUM PROC, WA PAPER NO. 376 GENERAL PAPER	(/)	1983 PROFIT AND LOSS HINGTON STATE UNIV EXTENSION SV				,	в, с



ECONOMICS		,			
INDUCED NUMBER ANIMALS		,	,	,	,
CONVERSION TO NUMBER ANIMALS		,			
INDUCED RESOURCE OUTPUT	,		,	,	t
POUNDS	,		SR SUPPLY	•	CHARAC
RANGE TYPE	1973 P AQUATIC VEGETATION	1963 SUITABILITY FOR WILDLIFE HABITAT 7-261 VARIOUIS	1986 LOODS, SEDIMENTATION & WATER SUPPLY T	1983 PLAINS GRASSLANDS	1984 ALIZED GRAZING SYSTEMS ON WATERSHED CHARAC MANAGEMENT, WESTVIEW PRESS, BOULDER, CO
PRACTICE	LAN, J. R.  MAINTAINING WATER QUALITY THROUGH CONTROL OF AQUATIC VEGETATION COPIES AVAILABLE UPON REQUEST PAPER NO. 370  WATER DEVELOPMENT	- 3	ET AL FORESTS & WATER: EFFECT OF FOREST MGMT ON FLOODS, USFS PSW-18 GENERAL TECHNICAL REPORT PAPER NO. 719 GENERAL WATERSHED MGMT	ACKBURN, W. H. LIVESTOCK GRAZING IMPACTS ON WATERSHEDS RANGELANDS 5(3):123-125 PAPER NO. 529 GRAZING	INTENSITY & SPECI ES FOR RANGELAND GRAZING SYSTEM
CITATION	ALLAN, J. R. MAINTAINING WATER QUALITY THR COPIES AVAILABLE UPON REQUEST PAPER NO. 370 WATER DI	ALLAN, PHILIP F.  RATING NORTHEASTERN SOILS FOR THEIR 28TH NORTH AMERICAN WILDLIFE CONF:2-	ANDERSON, HENRY W. FORESTS & WATER: E USFS PSW-18 GENERA PAPER NO. 719	BLACKBURN, W. H. LIVESTOCK GRAZING IMPAC' RANGELANDS 5(3):123-125 PAPER NO. 529 GI	BLACKBURN, WILBERT H. IMPACTS OF GRAZING INTENSITY & SPEC DEVELOPING STRATEGIES FOR RANGELAND PAPER NO. 411 GRAZING SYSTE

CITATION	PRACTICE	RANGE TYPE	POUNDS	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
BLAIR, ROBERT M. FORAGE PRODUCTION AFTER HARD FOREST SCIENCE 17(3):279-284	WOOD CONTROL IN	1971 A SOUTHERN PINE-HARDWOOD STAND	STAND	 	,   		 
PAPER NO. 310	RANGE REHABILITATION	LOBLLY-SHORTLF	×	•	1		ž
BROCK, J. H. INFILTRATION & SE JOURNAL OF RANGE	IOCK, J. H.  INFILTRATION & SEDIMENT PRODUCTION ON DEEP HARDLAND RANGE SITE IN N. CEN TX JOURNAL OP RANGE MANAGEMENT 35(2):195-198	1982 KDLAND RANGE SITE IN N. C	SEN TX				
PAPER NO. 323	RANGE REHABILITATION	PLAINS GRASSLANDS	i	ı	ı		ı
BRYANT, H. T.	ET AL	1972					
EFFECT TRAMPLING BY CATTLE ON AGRONOMY JOURNAL 64(3):331-334	EFFECT TRAMPLING BY CATTLE ON BLUEGRASS YIELD/SOIL COMPACT OF MEADOWVILLE LOAM AGRONOMY JOURNAL 64(3):331-334	SOIL COMPACT OF MEADOWVI	ILLE LOAM				
PAPER NO. 387	GRAZING SYSTEM	BLUEGRASS	×	×	ì	ı	ł
A MA	O MALLITTAM D	106.			٠		
APPLIC OF SOIL SU	APPLIC OF SOIL SURVEY INFO TO FOREST-GAME HABITAT MGMT ON CUMBERLAND NATL FOR	TAT MGMT ON CUMBERLAND N	ATL FOR				
SE GAME & PISH CO PAPER NO. 336	SE GAME & PISH COMMITTEE OP THE WILDLIFE SOCIETY PROC 1965:174-181 PAPER NO. 336 MULTIPLE VARIOUS	TY PROC 1965:174-181 VARIOUS	ı		1	1	
CHEQUAMEGON NATIONAL PORE	L PORE	1987					
POREST REPORT USFS REGION 9							
PAPER NO. 684	FOREST REPORT	ł		ę	ı	ŧ	В,С

			POUNDS	INDUCED	CONVERSION TO NUMBER	INDUCED	
CITATION	PRACTICE	RANGE TYPE	FORAGE	OUTPUT	ANIMALS	ANIMALS	ECONOMICS
CRAWFORD, BILL T. SOME SPECIFIC RELATIONSHIPS BETWEEN JOURNAL OF WILDLIPE MANAGEMENT 14(2)	AWFORD, BILL T. 195 SOME SPECIFIC RELATIONSHIPS BETWEEN SOILS AND WILDLIFE JOURNAL OF WILDLIPE MANAGEMENT 14(2):115-123	1950 LDLIFE	; ; ; 1 1 1 1 1	1 1 1 1 1 1 1 1 1		 	
PAPER NO. 337			,			ı	
CRAWFORD, BILL T. WILDLIPE SAMPLING BY SOIL TYPES 11TH NORTH AMERICAN WILDLIFE COI	AWFORD, BILL T. WILDLIPE SAMPLING BY SOIL TYPES 11TH NORTH AMERICAN WILDLIFE CONF:357-364	UNKWN					
PAPER NO. 338				,	•	ı	മ
DAWSON, JEFFREY O.  DINITROGEN-PIXING PLANT SYMBIOSES POR  OR ST UNIV, COLLEGE OP AGR SCI, SYMP	COMBINED SERIES 2.	1983 TIMBER AND LIVESTOCK PRODUCTION TIMBER PRESS, BEAVERTON:95-112	DUCTION 95-112				
PAPER NO. 362	VEGETATIVE MGMT	,	,	,	,		,
DISSMEYER, GEORGE E. CO MULTIRESOURCE INVENTORIES: USFS SE-247 RESEARCH PAPER	SSMEYER, GEORGE E. COST, NOEL D. 1984 MULTIRESOURCE INVENTORIES: WATERSHED CONDITION OF COMMERCIAL FOREST LAND IN SC USFS SE-247 RESEARCH PAPER	1984 DP COMMERCIAL FOREST LANI	D IN SC				
PAPER NO. 722	GENERAL WATERSHED MGMT	•			•	ı	,
DUVALL, V. L. ROTATION BURNING: A JOURNAL OF RANGE MA	VALL, V. L. ROTATION BURNING: A FORAGE MANAGEMENT SYSTEM FOR LONGLEAP PINE-BLUESTEM RANGES JOURNAL OF RANGE MANAGEMENT 17(6):322-326	1964 LONGLEAP PINE-BLUESTEM	RANGES				
PAPER NO. 318	RANGE REHABILITATION	LONGLEAF-BLUE STEM	×	×		×	,

CITATION	PRACTICE	RANGE TYPE	POUNDS	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
GIFFORD, GERALD F. GRAZING SYSTEMS AND JOURNAL OF SOIL AND PAPER NO. 419	FFORD, GERALD F. HAWKINS, RICHARD H. I. GRAZING SYSTEMS AND WATERSHED MANAGEMENT: A LOOK AT JOURNAL OF SOIL AND WATER CONSERVATION 31(6):281-283 PAPER NO. 419 GRAZING SYSTEM VAR	1976 LOOK AT THE RECORD :281-283 VARIOUS			,	:	,
GRELEN, H. E. RESPONSE OF SLASH PI USFS SO-54 GTR, 3RD PAPER NO. 171	ELEN, H. E. RESPONSE OF SLASH PINE TO GRAZING FROM REGENERATION TO FIRST PULPWOOD THINNING USFS SO-54 GTR, 3RD BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:523-527	1984 TION TO FIRST PULPWOOD T URAL RESEARCH CONF PROC: SLASH PINE	HINNING 523-527	ı		,	1
HALLS, L. K. GRAZING CAPACITY OF WIREGRASSPINE GEORGIA AGRIC EXP STA, UNIV OF GEOR PAPER NO. 413	LLS, L. K. GRAZING CAPACITY OF WIREGRASSPINE RANGES OF GEORGIA GEORGIA AGRIC EXP STA, UNIV OF GEORGIA COL OF AGRIC, TECHNICAL BULLETIN N.S. PAPER NO. 413	1956 Eorgia Gric, Technical Bulletin Pine-wiregrass	. s. s.	×		ı	æ
HALLS, L. K. SEASONAL VARIATION IN GRAZING USE, GEORGIA AGRIC EXP STA, UNIV OP GEO PAPER NO. 414 GRAZING SYST	ec (1)	1957 NUTRITIVE CONTENT & DIGESTIBILITY WIREGRASS GIA COL OF AGRIC, TECHNICAL BULLETIN N.S.11 M PINE-WIREGRASS	REGRASS N.S.11	ı	ı		
HALLS, LOWELL K.  TREE-HERBAGE RELATIONS IN PINE-HA JOURNAL OF FORESTRY 63(4):282-283 PAPER NO. 365	LLS, LOWELL K. SCHUSTER, JOSEPH L. TREE-HERBAGE RELATIONS IN PINE-HARDWOOD FORESTS JOURNAL OF FORESTRY 63(4):282-283 PAPER NO. 365	1965 OF TEXAS PINE-HARDWOOD	×	×			,

CITATION	PRACTICE	RANGE TYPE	POUNDS	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
HURST, GEORGE A.  WARREN, RANDY IMPACTS OF SILVIC PRACTICES IN LOBLOL USFS SE-24 GTR, 2ND BIENNIAL SOUTHERN PAPER NO. 347 MULTIPLE	WARREN, RANDY C. RACTICES IN LOBLOLLY PLANT BIENNIAL SOUTHERN SILVICU MULTIPLE	RST, GEORGE A. WARREN, RANDY C. 1982 IMPACTS OF SILVIC PRACTICES IN LOBLOLLY PLANTATIONS ON WHITE-TAILED DEER HAB USFS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVICULTURE RESEARCH CONP PROC:484-487 PAPER NO. 347 MULTIPLE	R HAB 184-487 X	×	,	•	:
JOYCE, LINDA A.	ET AL	1986					
RANGE PORAGE DATA BASE POR 20 GREAT PUSPS RM-133 GENERAL TECHNICAL REPORT PAPER NO. 390	Δ.	LAINS, SOUTHERN, AND WESTERN STATES	× «	ı	×		
LEWIS, CLIPPORD E. RESPONSES TO CHOPPI	WIS, CLIPPORD E. RESPONSES TO CHOPPING AND ROCK PHOSPHATE ON S	1970 SOUTH PLORIDA RANGES					
JOURNAL OF RANGE MA PAPER NO. 327	JOURNAL OF RANGE MANAGEMENT 23(4):276-282 PAPER NO. 327 RANGE REHABILITATION	LONGLEAF-SLASH PINE	×	×		,	,
LEWIS, CLIPPORD E. ET AL PRESCRIBED BURNING IN SOUTHERN POREST SOUTHERN JOURNAL OF APPLIED PORESTRY	9	1982 & RANGELAND IMPROVES PORAGE & ITS USE (1):19-25	USE				
PAPER NO. 317 LEWIS, CLIPPORD E.	RANGE REHABILITATION	ALL SOUTHERN UNKWN	×	×	1	×	•
FORAGE YIELDS IMPRO	FORAGE YIELDS IMPROVED BY SITE PREPARATION IN SOUTHERN JOURNAL OF APPLIED PORESTRY:181-185	PINE FLATWOODS OF NORTH FLORIDA	LORIDA				
PAPER NO. 354	SITE PREPARATION	SLASH PINE	×	×			

				INDUCED	CONVERSION	INDUCED	
			POUNDS	RESOURCE	TO NUMBER	NUMBER	
CITATION	PRACTICE	RANGE TYPE	PORAGE	OUTPUT	ANIMALS	ANIMALS	ECONOMICS
LULL, HOWARD W.	REINHART, KENNETH G.	1972					
FORESTS AND PLOODS	FORESTS AND PLOODS IN THE EASTERN UNITED STATES						
USPS NE-226 RESEARCH PAPER	H PAPER						
PAPER NO. 429	GENERAL PAPER				•	•	
LUNDGREN, GWYNNE K.	ET AL	1983					
AN ECONOMIC ANALYSI	AN ECONOMIC ANALYSIS OF POREST GRAZING ON FOUR TIMBER MANAGEMENT SITUATIONS	TIMBER MANAGEMENT SITUAT	IONS				
SOUTHERN JOURNAL OF APPLIED PORESTRY	APPLIED PORESTRY 7(3):119-124	45					
PAPER NO. 352	VEGETATIVE MGMT	LONGLEAP-SLASH PINE	×	×	×	×	B, C, IRR
MOORE, WILLIAM H.	ET AL	1982					
VEGETATIVE RESPONSE	IBED PIRE IN	A NORTH PLORIDA PLATWOODS FOREST	EST				
JOURNAL OF RANGE MA	JOURNAL OF RANGE MANAGEMENT 35(3):386-389						
PAPER NO. 319	RANGE REHABILITATION	LONGLEAF-SLASH PINE	×	×	•		
3 3 3 3 5 5	14 E3	1082					
CNIETHORN OF ASNOGSAG AVITATAGAV	NI ONIGOCHO & ONITETIONALIO CE	•	10000				
JOURNAL OF RANGE MANAGEMENT 35(2):(2)							
PAPER NO. 326		LONGLEAP-SLASH PINE	×	×			
MURPHY, DEAN A.	PORATH, WAYNE R.	UNKWN					
POREST SOILS AND GAME NUTRITION MISSOURI DEPT OF CONSERVATION,	POREST SOILS AND GAME NUTRITION MISSOURI DEPT OP CONSERVATION, COLUMBIA, MISSOURI	1					
PAPER NO. 339			,				

				TNDUCED	CONVERSION	INDICED	
			POUNDS	RESOURCE	TO NUMBER	NUMBER	
CITATION	PRACTICE	RANGE TYPE	PORAGE	OUTPUT	ANIMALS	ANIMALS	ECONOMICS
NATIONAL RESEARCH C	NATIONAL RESEARCH COUNCIL NAT'L ACADEMY OF	OP SCIENCES 1984	1 1 1 1 1 1 1 1	0 1 1 1 1 1 1 1 1 1	0 0 0 0 0 0 0 0 0	1 1 1 1 1 1 1 1	
DEVELOPING STRATE	ECONOMIC PEASIBILITY AND PUBLIC RANGE INV DEVELOPING STRATEGIES FOR RANGELAND MEMT	ECONOMIC PEASIBILITY AND PUBLIC RANGE INVESTMENT DEVELOPING STRATEGIES POR RANGELAND MEMT WESTVIEW PRESS. BOULDER. CO. 1984	1984				
PAPER NO. 375	GENERAL PAPER	ALL	×	×	×	:: ×	B, C, B/C, IRR
NIELSEN, DARWIN B.		1964					
ESTIMATING THE EC	ESTIMATING THE ECONOMIC VALUE OF THE RANG COMMITTEE ON ECON OF RNG USE & DEVELOP OF	RANGE RESOURCE FROM LIVESTOCK PRODUCTION PP OF WAGRIC ECON RESEARCH COUNCIL, RPT 6	UCTION RPT 6				
PAPER NO. 374		•	×	×	×	×	В, С
PEARSON, H. A.	WHITAKER, L. B.	1974					
PORAGE & CATTLE R	PORAGE & CATTLE RESPONSES TO DIPP GRAZING INTENSITIES ON	INTENSITIES ON SOUTHERN PINE RIDGE	RIDGE				
JOURNAL OF RANGE	JOURNAL OF RANGE MANAGEMENT 27(6):444-446						
PAPER NO. 405	GRAZING SYSTEM	PINE-BLUESTEM	×	×	×	×	83
PEARSON, H. A.		1975					
HERBAGE DISAPPEAR	HERBAGE DISAPPEARANCE & GRAZING CAPACITY	TY DETERM OF SOUTHERN PINE BLUESTEM RNG	EM RNG				
JOURNAL OF RANGE	JOURNAL OF RANGE MANAGEMENT 28(1):71-73						
PAPER NO. 406	GRAZING SYSTEM	SOUTH PINE-BLUESTEM	×	×	×	×	1
PEARSON, HENRY A.		1980					
FOREST AND RANGE INTERACTIONS	INTERACTIONS						
USFS SO-34 GTR, I	USFS SO-34 GTR, IST BIENNIAL SOUTHERN SIL	SILVICULTURAL RESEARCH CONP PROC:339-342	339-342				
PAPER NO. 360	*	SOUTHERN FOREST	×	×	×	×	B, C, IRR

CITATION	PRACTICE	RANGE TYPE	POUNDS	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
PEARSON, HENRY A.  POREST GRAZING IN THE SOUTHERN UNITE OR ST UNIV, COLLEGE OF AGR SCI, SYMP PAPER NO. 358  VEGETATIVE MGM	D STATES SERIES 2.	1983 TIMBER PRESS, BEAVERTON:247-260 SOUTHERN FOREST X	47-260 x	×	×		
POWELL, JEPP RANGELAND WATERSHED WATER BUDGET AND US ENVIRONMENTAL PROTECTION AGENCY, F PAPER NO. 409 GRAZING SYSTEM	a " =	1983 GRAZING CATTLE WASTE NUTRIENT CYCLING :PA-600/S2-83-017 TALLGRASS PRAIRIE X	S ×	×	×	×	
RHOADES, EDD D.  WATER INTAKE ON SANDY RANGE APPECTED JOURNAL OP RANGE MANAGEMENT 17(4):18 PAPER NO. 420 GRAZING SYSTEM	OADES, EDD D. WATER INTAKE ON SANDY RANGE APPECTED BY 20 YRS OF JOURNAL OP RANGE MANAGEMENT 17(4):185-190 PAPER NO. 420 GRAZING SYSTEM P	1964 P DIPPERENTIAL CATTLE STOCKING PLAINS GRASSLANDS	OCKING -	,			,
SPEAKE, D. W. ASPECTS OP LAND MGMT WITH REGARD TO JATH NORTH AMERICAN POREST SOILS CONPPAPER NO. 343	<u>-</u>	1975 PRODUCTION OP WOOD & WILDLIPE SE U.S PROC:333-349	. ×	×	×		æ
STRANSKY, JOHN J. PORAGE AND PINE GRC USPS SO-34 GTR, IST PAPER NO. 353	RANSKY, JOHN J. HALLS, LOWELL K. 1980 PORAGE AND PINE GROWTH WITH CLEARCUTTING AND SITE PREPARATION USPS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONP PROC:343-348 PAPER NO. 353 VEGETATIVE MCMT .	1980 E PREPARATION RAL RESEARCH CONP PROC:3	43-348 x	×		,	

CITATION	PRACTICE	RANGE TYPE	POUNDS	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
THILL, RONALD E. CATTLE PRODUCTION ON RANGELANDS 1(2):60-61 PAPER NO. 359	ILL, RONALD E. WOLTERS, GALE L.  CATTLE PRODUCTION ON A SOUTHERN PINE-HARDWOOD FOREST RANGELANDS 1(2):60-61  PAPER NO. 359  VEGETATIVE MGMT SOU'	1979 BREST SOUTHERN FOREST	×	×	,	ŧ.	o,
TYGER RANGER DISTRICT WATERSHED IMPROVEMENT PROGRAM, PROJECT PRANCIS MARION & SUMTER NATIONAL FORES' PAPER NO. 692 POREST REPORT		UNKWN COST-EPFECTIVENESS ANALYSIS T. REGION 8					B, C, B/C
VAN DERSAL, WILLIAM R. THE DEPENDENCE OF SOILS ON ANIMAL LIFE 2ND NORTH AMERICAN WILDLIPE CONP:458-467 PAPER NO. 340	LLS ON ANIMAL LIFE LDLIPE CONP:458-467	C N K E N		•			
VARIOUS POREST REPORT CHATTAHOOCHEE-OCONEE NATIONAL POREST, PAPER NO. 682 POREST REPORT	NATIONAL POREST, REGION 8 POREST REPORT	1986	,	×			B, C, B/C
WERTZ, WILLIAM A. INTERPRETATION OP SOI THE AMERICAN MIDLAND PAPER NO. 341	I96 INTERPRETATION OP SOIL SURVEYS FOR WILDLIFE MANAGEMENT THE AMERICAN MIDLAND NATURALIST 75(1):221-231 PAPER NO. 341	1965 GEMENT	,	,		,	,

CITATION			POUNDS	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
WOLTERS, GALE L. SOUTHERN PINE OVI JOURNAL OF RANGE PAPER NO. 364	WOLTERS, GALE L. SOUTHERN PINE OVERSTORIES INFLUENCE HERBAGE QUALITY JOURNAL OF RANGE MANACEMENT 26(6):423-426 PAPER NO. 364 VEGETATIVE MGMT SOI	1973 HERBAGE QUALITY 3-426 T SOUTH PINE BLUESTEM	×	×	×	,	
WOOD, GENE W. INFLUENCES OF FOI SOUTHERN JOURNAL PAPER NO. 345	OD, GENE W.  INFLUENCES OF FOREST PERTILIZATION ON SOUTH CAROLINA DEER FORAGE QUALITY SOUTHERN JOURNAL OF APPLIED PORESTRY 10:203-205 PAPER NO. 345  FRATILIZATION	1986 ROLINA DEER FORAGE QUALI 5	Υ ×	×			,

# FORAGE MODEL - CITATIONS FOR UNSPECIFIED GEOGRAPHIC REGION

GESTIMATING BENEFITS OF RANCE FOR WILDLAND MANAGENENT AND PLANNING VALUATION OF WILDLAND PRESSOURCE SINGETTS. WESTVIEW FRESS BOULDER, CO. 1984:143-55  FAPER NO. 379  CHAGAMANARIY, SHRI M. K.  DESVOUSCES, WILLIAM M. SKAMEN, VENETIA A. 1985  PAPER NO. 735  ECONOMIC ANALYSIS  DESVOUSCES, WILLIAM M. SKAMEN, VENETIA A. 1985  TYPE B TECHNICAL INFORMATION DOCUMENT: TECHNIQUES TO MASURE DAMAGES TO NATURA  RESEARCH TRIANGLE INSTITUTE MOJECT 3142-05PR  FAPER NO. 745  ECONOMIC ANALYSIS  IAVCOCK, WILLIAM A.  1982  IAVCOCK, WILLIAM A.  1982  IAVCOCK, WILLIAM A.  1982  IAVCOCK, WILLIAM A.  1988  IAVCOCK SERVILLIAM A.  1988  IAVCOCK SERVILLIAM A.  1988  IAVCOCK WILLIAM A.  1988	CITATION	PRACTICE	RANGE TYPE	POUNDS	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
P RANGE POR WILDLAND MANAGEMENT AND PLANNING ESOURCE BENEFITS. WESTVIEW PRESS BOULDER, CO, 1984:143-55  GENERAL PAPER  1977  EPITS VALUATION, A BIBLIOGRAPHY MANAGEMENT  TRECHOIGE ANALYSIS  ECONOMIC ANALYSIS  SKAHEN, VENETIA A. 1965  SRAATION DOCUMENT: TECHNIQUES TO MASURE DAMAGES TO NATURA  TITUTE PROJECT 3142-05DR  ECONOMIC ANALYSIS  NO TO IMPROVE HIGH-ELEVATION RANGELANDS  TECHNICAL REPORT  RANGE REHABILITATION HI-ELEVATION ROCLINDS  X X X	BARTLETT, E. T.		1984					
EPITS VALUATION, A BIBLIOGRAPHY MANAGEMENT, TECHNICAL NOTE 302  ECONOMIC ANALYSIS  D MANAGEMENT  1978  D MANAGEMENT  TECHNICAL NOTE 302  1978  D MANAGEMENT  THORE PROJECT AND	ESTIMATING BENEFIT VALUATION OF WLDLN BABES NO 220	IS OF RANGE FOR WILDLAND MID RESOURCE BENEFITS. WEST	ANAGEMENT AND PLANNING VIEW PRESS BOULDER, CO, 1	1984:143-55	,	,		c a
EPITS VALUATION, A BIBLIOGRAPHY MANAGEMENT, TECHNICAL NOTE 302  ECONOMIC ANALYSIS  ATER CONSERVATION IN INDIA 28(1-4):69-75  ECONOMIC ANALYSIS  SKAHEN, VENETIA A. 1985  RHATION DOCUMENT: TECHNIQUES TO MEASURE DAMAGES TO NATURA TITUTE PROJECT 3142-05DR  ECONOMIC ANALYSIS  NG TO IMPROVE HICH-ELEVATION RANGELANDS  TECHNICAL REPORT  RANGE REHABILITATION HI-ELEVATION RUGINDS X X	610 .00 .01							ءُ
EPITS VALUATION, A BIBLIOGRAPHY MANAGEMENT, TECHNICAL NOTE 302 ECONOMIC ANALYSIS  D MANAGEMENT ATER CONSERVATION IN INDIA 28(1-4):69-75 ECONOMIC ANALYSIS  SKAHEN, VENETIA A. 1985 RMATION DOCUMENT: TECHNIQUES TO MEASURE DAMAGES TO NATURA TITUTE PROJECT 3142-05DR ECONOMIC ANALYSIS  1982 NG TO IMPROVE HIGH-ELEVATION RANGELANDS TECHNICAL REPORT RANGE REHABILITATION HI-ELEVATION RNGLNDS X X	BRNA, PAUL		1977					
BCONOMIC ANALYSIS  1978  D MANAGEMENT  THER CONSERVATION IN INDIA 28(1-4):69-75  ECONOMIC ANALYSIS  SKAHEN, VENETIA A. 1985  RHATION DOCUMENT: TECHNIQUES TO MEASURE DAMAGES TO NATURA TITUTE PROJECT 3142-05DR  ECONOMIC ANALYSIS  1982  NG TO IMPROVE HIGH-ELEVATION RANGELANDS  TECHNICAL REPORT  RANGE REHABILITATION HI-ELEVATION RNGLNDS X X	POREST MANAGEMENT	BENEFITS VALUATION, A BIB	LIOGRAPHY					
ECONOMIC ANALYSIS  1978  D MANAGEMENT  ATER CONSERVATION IN INDIA 28(1-4):69-75  ECONOMIC ANALYSIS  SKAHEN, VENETIA A. 1985  TITUTE PROJECT 3142-05pR  ECONOMIC ANALYSIS  1982  NG TO IMPROVE HIGH-ELEVATION RANGELANDS  TECHNICAL REPORT  RANGE REHABILITATION  HI-ELEVATION RNGLNDS X X ' ' ' ' ' '	USDI, BUREAU OF LA	IND MANAGEMENT, TECHNICAL	NOTE 302					
D MANAGEMENT  ATER CONSERVATION IN INDIA 28(1-4):69-75  ECONOMIC ANALYSIS  SKAHEN, VENETIA A. 1985  RMATION DOCUMENT: TECHNIQUES TO MEASURE DAMAGES TO NATURA TITUTE PROJECT 3142-05DR  ECONOMIC ANALYSIS  1982  NG TO IMPROVE HIGH-ELEVATION RANGELANDS  TECHNICAL REPORT  RANGE REHABILITATION HI-ELEVATION RNGLNDS X X -	PAPER NO. 735	ECONOMIC ANALYSIS	•	,	ı	,	,	æ
IND WATER CONSERVATION IN INDIA 28(1-4):69-75  ECONOMIC ANALYSIS  H. SKAHEN, VENETIA A. 1985  INPORMATION DOCUMENT: TECHNIQUES TO MEASURE DAMAGES TO NATURA  INSTITUTE PROJECT 3142-05DR  ECONOMIC ANALYSIS  LIZING TO IMPROVE HIGH-ELEVATION RANGELANDS  INSTITUTE REPORT  RANGE REHABILITATION HI-ELEVATION RNGLNDS X X	CHAKRAVARTY, SHRI M.	<u>*</u>	1978					
ECONOMIC ANALYSIS  H. SKAHEN, VENETIA A. 1985  INPORMATION DOCUMENT: TECHNIQUES TO MEASURE DAMAGES TO NATURA  INSTITUTE PROJECT 3142-05DR  ECONOMIC ANALYSIS  1982  LIZING TO IMPROVE HIGH-ELEVATION RANGELANDS  IRAL TECHNICAL REPORT  RANGE REHABILITATION HI-ELEVATION RNGLNDS X X -	ECONOMICS OF WATER	SSHED MANAGEMENT						
H. SKAHEN, VENETIA A. 1985 INFORMATION DOCUMENT: TECHNIQUES TO MEASURE DAMAGES TO NATURA INSTITUTE PROJECT 3142-05DR ECONOMIC ANALYSIS  1982 LIZING TO IMPROVE HIGH-ELEVATION RANGELANDS RAL TECHNICAL REPORT RANGE REHABILITATION HI-ELEVATION RNGLNDS X X	JOURNAL OF SOIL AN	ND WATER CONSERVATION IN I	NDIA 28(1-4):69-75					
IH. SKAHEN, VENETIA A. 1985 INPORMATION DOCUMENT: TECHNIQUES TO MEASURE DAMAGES TO NATURA  INSTITUTE PROJECT 3142-05DR  ECONOMIC ANALYSIS  1982  LIZING TO IMPROVE HIGH-ELEVATION RANGELANDS  RAL TECHNICAL REPORT  RANGE REHABILITATION HI-ELEVATION RNGLNDS X X -	PAPER NO. 736	ECONOMIC ANALYSIS	•	,	ı	,	ı	
INFORMATION DOCUMENT: TECHNIQUES TO MEASURE DAMAGES TO NATURA  INSTITUTE PROJECT 3142-05DR  ECONOMIC ANALYSIS  1982  LIZING TO IMPROVE HIGH-ELEVATION RANGELANDS  RAL TECHNICAL REPORT  RANGE REHABILITATION HI-ELEVATION RNGLNDS X X -	MATTITIES SADSHOVSAG		800					
ECONOMIC ANALYSIS  ECONOMIC ANALYSIS  1982  LIZING TO IMPROVE HIGH-ELEVATION RANGELANDS  RAL TECHNICAL REPORT  RANGE REHABILITATION HI-ELEVATION RNGLNDS X X -	TYPE B TECHNICAL I	INPORMATION DOCUMENT: TECH	NIQUES TO MEASURE DAMAGES	S TO NATURA				
ECONOMIC ANALYSIS  1982  LIZING TO IMPROVE HIGH-ELEVATION RANGELANDS  RAL TECHNICAL REPORT  RANGE REHABILITATION HI-ELEVATION RNGLNDS X X -	RESEARCH TRIANGLE	INSTITUTE PROJECT 3142-05	DR					
1982 LIZING TO IMPROVE HIGH-ELEVATION RANGELANDS RAL TECHNICAL REPORT RANGE REHABILITATION HI-ELEVATION RNGLNDS X X -	PAPER NO. 745	ECONOMIC ANALYSIS		•			,	ı
1982 LIZING TO IMPROVE HIGH-ELEVATION RANGELANDS RAL TECHNICAL REPORT RANGE REHABILITATION HI-ELEVATION RNGLNDS X X -								
GH-ELEVATION RANGELANDS ATION HI-ELEVATION RNGLNDS X X -	LAYCOCK, WILLIAM A.		1982					
ATION HI-ELEVATION RNGLNDS X X -	SEEDING AND PERTIL	IZING TO IMPROVE HIGH-ELE	VATION RANGELANDS					
RANGE REHABILITATION HI-ELEVATION RNGLNDS X X -	USPS INT-120 GENER	AL TECHNICAL REPORT						
	PAPER NO. 333	RANGE REHABILITATION	HI-ELEVATION RNGLND		×			

## FORAGE MODEL - CITATIONS FOR UNSPECIFIED GEOGRAPHIC REGION

			POUNDS	INDUCED	CONVERSION TO NUMBER	INDUCED	
CITATION	PRACTICE	RANGE TYPE	PORAGE	OUTPUT	ANIMALS	ANIMALS	ECONOMICS
LEWIS, CLIFFORD E. CHOPPING AND WEBB	WIS, CLIFFORD E. CHOPPING AND WEBBING CONTROL SAW-PALMETTO IN	1972 SOUTH FLORIDA	1 1 1 1 1 1 1 1	, 	; ; ; ; ; ; ; ; ; ; ; ; ;	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1
USFS SE-177 RESEARCH NOTE PAPER NO. 328 RAN	RCH NOTE RANGE REHABILITATION	LONGLEAP-SLASH PINE	ě	ı	,	ı	ŧ
LUSBY, GREGG C.		0.261					
HYDROLOGIC & BIOT JOURNAL OF RANGE	HYDROLOGIC & BIOTIC EPPECTS OF GRAZING VS. NON-GRAZING NEAR GRAND JUNCTION, JOURNAL OP RANGE MANAGEMENT 3:256-260	N-GRAZING NEAR GRAND JUNCT	TION, CO				
PAPER NO. 416	GRAZING SYSTEM	DESERT SHRUB	,			,	,
MCCORKLE, C. O., JR.		1957					
APPLIC OF LINEAR COMMITTEE ON ECON	ROGRAM TO RESEARCH	IN ECONOMICS OF RANGE IMPROVE/UTILIZATION OF OF WAGRIC ECON RESEARCH COUNCIL, RPT 1	LIZATION L, RPT 1				
PAPER NO. 380	GENERAL PAPER	•	·	·		ŧ	В, С
NIELSEN, DARWIN B.		1984					
DEVELOPING STRATE	ECONOMIC FACTORS TO BE CONSIDERED IN SAGEBRUSH DEVELOPING STRATEGIES FOR RANGELAND MANAGEMENT	SAGEBRUSH/GRASSLAND MANAGEMENT					
PAPER NO. 377	_	SAGEBRUSH	×	×	×	×	B, C, IRR
RIITTERS, K.	BRODIE, J. D.	1983		,			
DYNAMIC PROGRAMMI	DYNAMIC PROGRAMMING POR OPTIMIZATION OF FORAGE		NC JCC				
PAPER NO. 381	257153	. IIMDEN FRESS, BEAVERION:325-327	: 325-321	1	ŧ	,	,

# FORAGE MODEL - CITATIONS FOR UNSPECIFIED GEOGRAPHIC REGION

CITATION	PRACTICE	RANGE TYPE	POUNDS	RESOURCE	TO NUMBER ANIMALS	NUMBER	ECONOMICS
THILENIUS, JOHN P.  ALPINE RANGE MGMT IN WESTERN UNITED	STATES	1975 - PRINCIPLES, PRACTICES & PNOBLEMS	ROBLEMS				
USFS NM-15/ NESEANCH FAFEN PAPER NO. 402 MULT	MULTIPLE	ALPINE RANGE	×	ŧ	ı		2
TOWNSEND, JOSEPH E. IMPROVING PISH AND US DEPT OF THE INT	TOWNSEND, JOSEPH E. (ED) SMITH, ROBERT J. (ED) 1977 IMPROVING PISH AND WILDLIFE BENEPITS IN RANGE MANAGEMENT US DEPT OP THE INTERIOR, PWS/OBS-77/1	1977 E MANAGEMENT					
PAPER NO. 351	GENERAL PAPER			•		ı	ı
WELLS, CAROL G.  EFFECTS OP FIRE ON SOIL, A STATE-OI USFS WO-7 GENERAL TECHNICAL REPORT	LLS, CAROL G. ET AL EFFECTS OP FIRE ON SOIL, A STATE-OP-KNOWLEDGE REVIEW USFS WO-7 GENERAL TECHNICAL REPORT	1978 E REVIEW					
PAPER NO. 729	GENERAL WATERSHED MGMT	,	·	ı	ł	ŧ	ı
WOOD, M. KARL GHAZING SYSTEMS: T JOURNAL OF RANGE M	OD, M. KARL BLACKBURN, WILBERT H. 1981 GRAZING SYSTEMS: THEIR INPLUENCE ON INPILTRATION RATES IN ROLLING PLAINS OF JOURNAL OF RANGE MANAGEMENT 34(4):331-335	FION RATES IN ROLLING PLAI	NS OF TX				
PAPER NO. 418	GRAZING SYSTEM		,	,		,	ŧ



CITATIONS FOR ROAD MODEL



#### HOAD MODEL - CITATIONS FOR ALL REGIONS

CITATION	PRACTICE	RANGE TYPE	CONSTRUC- TION COST	MAINTEN- ANCE COST	CONSTRUCT	MAINTEN	ECONOMICS
ADAMS, PAUL W. ESTIM STREAMPLOWS OREGON STATE UNIV	AMS, PAUL W.  ESTIM STREAMPLOWS ON SMALL PORESTED WATE OREGON STATE UNIV, COLLEGE OP PORESTRY, PAPER NO. 673  ROAD CULVERTS	1986 ATERSHEDS FOR CULVERT/BRIDGE DESIGN IN OR Y, RESEARCH BULLETIN 55	SIGN IN OR	,	,	÷	,
AMARANTHUS, MICHAEL P. ET AL LOGGING & POREST ROADS RELATED TO JOURNAL OF PORESTRY 83(4):229-233 PAPER NO. 660 ROAD LOCATI	ARANTHUS, MICHAEL P. ET AL LOGGING & POREST ROADS RELATED TO INCREASED DEBRIS JOURNAL OF PORESTRY 83(4):229-233 PAPER NO. 660 ROAD LOCATION	1985 ASED DEBRIS SLIDES IN SOUTHWEST OREGON	ST OREGON				
ANDERSON, HENRY W. PORESTS & WATER: USPS PSW-18 GENEP PAPER NO. 719	DERSON, HENRY W. ET AL PORESTS & WATER: EPPECT OP POREST MGMT ON FLOODS, USPS PSW-18 GENERAL TECHNICAL REPORT PAPER NO. 719 GENERAL WATERSHED MGMT "	1986 ON FLOODS, SEDIMENTATION & WATER SUPPLY MGMT -	TER SUPPLY				
ANDERSON, PAUL GRADEABILITY & CC IMPROV MTN LOGGIN PAPER NO. 658	DERSON, PAUL GRADEABILITY & COST CONSIDERATIONS IN VEHICL IMPROV MTN LOGGING PLANNING TECH & HARDWARE: PAPER NO. 658 ROAD LOCATION	N VEHICLE OPERATIONS ON STEEP ROADS RDWARE: JOINT SYMP, IUFRO MNT LOG	ADS OG SECTION X		×	•	υ
APACHE/SITGREAVES N.P. THREE FORKS ROAD NO. USFS REGION 3 PAPER NO. 700	ACHE/SITGREAVES N.P. THREE FORKS ROAD NO. 249 RECONSTRUCTION USFS REGION 3 PAPER NO. 700 POREST REPORT	1984		,	•		B. C

ECONOMICS		1	ı	B, C	v
MAINTEN	,	×	1	,	
CONSTRUCT	,	1			
MAINTEN- ANCE COST	,	ı			
CONSTRUC- TION COST	,	CCH BULLETIN 435	ANGE -	GMT PRACTICES -60, EXHIBIT B	IULATED RAINFALL RM-W-26:187-190
RANGE TYPE	1966 1966	1984 TE EFFECTS ON WATER QUALITY & UTILI STREAM IMPROV, INC, TECH BULLETIN	1971 In the oregon coast range Forested	1982 ROADS ON WATER QUALITY & MGMT PRACTICES DIVISION, CONTRACT 70-541-60, EXHIBIT B	PROPOSED RES PROG USING SIMULATED RAINFALL SED YLD ON RNGLNDS PROC, ARM-W-26:187-190
	, JR. ROAD	OSSER, RUSSELL O. FORESTRY MANAGEMENT PRACTICES & CUMULATIVE EFFECTS ON WATER QUALITY & UTILITY NATL COUNCIL OF PAPER INDUSTRY FOR AIR & STREAM IMPROV, INC, TECH BULLETIN 43 PAPER NO. 427 GENERAL PAPER	CLEAR-CUT LOGGING AND SEDIMENT PRODUCTION I WATER RESOURCES RESEARCH 7(5):1189-1198 PAPER NO. 480 LOGGING SYSTEM		BURROUGHS, EDWARD R., JR. SUNDBERG, ERIC S. SURFACE EROSION PROM FOREST ROADS-A PROPOSED USDA ARS WORKSHOP ON ESTIM EROSION & SED YLD PAPER NO. 651
CITATION	BETHLAHMY, NEDAVIA KIDD, W. JOE CONTROLLING SOIL MOVEMENT PROM STEEP USFS INT-45 RESEARCH NOTE PAPER NO. 654 SLOPE REVEGETA'	BLOSSER, RUSSELL O. FORESTRY MANAGEMENT NATL COUNCIL OF PAF PAPER NO. 427	BROWN, GEORGE W. CLEAR-CUT LOGGING A WATER RESOURCES RES	BROZKA, ROBERT J.  EFFECTS OF TIMBER HARVESTING & ASSOC  NEW MEXICO SOIL & WATER CONSERVATION  PAPER NO. 550  MULTIPLE	BURROUGHS, EDWARD R., JR. SUNDBERG, ER SURFACE EROSION PROM FOREST ROADS-A USDA ARS WORKSHOP ON ESTIM EROSION & PAPER NO. 651 MULTIPLE

CITATION	PRACTICE	RANGE TYPE	CONSTRUC- TION COST	MAINTEN- ANCE COST	CONSTRUCT	MAINTEN	ECONOMICS
BURROUGHS, EDWARD R., JR. KING, JOHN G SURPACE EROSION CONTROL ON ROADS IN USFS ENGINEERING STAFF, WASHINGTON, PAPER NO. 656 MULTIPLE	IRROUGHS, EDWARD R., JR. KING, JOHN G. SURPACE EROSION CONTROL ON ROADS IN GRANITIC USFS ENGINEERING STAPP, WASHINGTON, D.C. PAPER NO. 656 MULTIPLE	1985 c soils	,	,	,	,	
CHAKRAVARTY, SHRI M. K. ECONOMICS OF WATERSHED MANAGEMENT JOURNAL OF SOIL AND WATER CONSERV PAPER NO. 736 ECONOMIC AN	AKRAVARTY, SHRI M. K. ECONOMICS OF WATERSHED MANAGEMENT JOURNAL OP SOIL AND WATER CONSERVATION IN INDIA 28(1-4):69-75 PAPER NO. 736 ECONOMIC ANALYSIS	1978 NDIA 28(1-4):69-75	,			•	
CHEQUAMEGON NATIONAL FORE POREST REPORT USPS REGION 9 PAPER NO. 684 P	L FORE POREST REPORT	1987	,		,	×	<b>o</b>
CLARK, ROGER N. INFLU FOR/RNG MGT USPS PNW-178 GENE PAPER NO. 574	ARK, ROGER N.  INPLU FOR/RNG MGT ON ANADRO FISH HABITAT WE USFS PNW-178 GENERAL TECHNICAL REPORT PAPER NO. 574  RECREATION	ARK, ROGER N.  INPLU FOR/RNG MGT ON ANADRO FISH HABITAT WEST N. AMERICA: INFLU OF RECREATION USPS PNW-178 GENERAL TECHNICAL REPORT PAPER NO. 574  RECREATION  RIPARIAN & AQUATIC	CREATION				ı
CLINE, LEO D.  EPFECTS OF HIGHWAY CONSTRU USFS RM-429 RESEARCH NOTE PAPER NO. 549 ROAI	F AL JCT ON WATER QUAL JS	1983 & BIOTA IN ADJACENT COLO MTN STREAM RIPARIAN	IN STREAM	•			

### ROAD MODEL - CITATIONS FOR ALL REGIONS

CITATION	PRACTICE RA	RANGE TYPE	CONSTRUC- TION COST	MAINTEN- ANCE COST	CONSTRUCT	MAINTEN	ECONOMICS
COOK, WALTER L., JR. HEWLETT, JOHN THE BROAD-BASED DIP ON PIEDMONT WOODS SOUTHERN JOURNAL OF APPLIED FORESTRY PAPER NO. 653 ROAD LOCATION	HEWLETT, JOHN D.  NO PIEDMONT WOODS ROADS  APPLIED FORESTRY 3(3):77-81  ROAD LOCATION	1979	×	,	,	; <del>`</del>	۵
CORANADO NATIONAL FOREST MEMO AND REPORT OF WAS USPS REGION 3 PAPER NO. 696	HINGTON CAMPERPO PROJECT POREST REPORT	1986 RIPARIAN	×	•	4		ú
DISSMEYER, GEORGE E. COST, NOEL D. WULTIRESOURCE INVENTORIES: WATERSHED USPS SE-247 RESEARCH PAPER PAPER NO. 722 GENERAL WATERSP		1984 CONDITION OF COMMERCIAL FOREST LAND IN O	ID IN SC				,
FREDRIKSEN, R. L. EROSION & SEDIMENT POLLOW RG USFS PNW-104 RESEARCH PAPER PAPER NO. 665	EDRIKSEN, R. L. EROSION & SEDIMENT FOLLOW ROAD CONSTRUCT/TIMBER HARVEST UNSTABLE SOILSW. USFS PNW-104 RESEARCH PAPER PAPER NO. 665 MULTIPLE	1970 HARVEST UNSTABLE SOILS.	85 O 38 				
FROEHLICH, H. A.  SOIL BULK DENSITY RECOVERY ON COMPACTED  SOIL SCIENCE SOCIETY OF AMERICA JOURNAL  PAPER NO. 666  GENERAL	OEHLICH, H. A. ET AL SOIL BULK DENSITY RECOVERY ON COMPACTED SKID TRAILS IN CENTRAL IDAHO SOIL SCIENCE SOCIETY OF AMERICA JOURNAL 49(4)	1985 AILS IN CENTRAL IDAHO					

ECONOMICS	,	U			,	,
MAINTEN	,					
CONSTRUCT	,			,		
MAINTEN- ANCE COST	,			,	,	×
CONSTRUC- TION COST	BULLETIN 555	×	ICES IN W. WA/W. OR	•	FROM LOGGING ROADS	•
RANGE TYPE	FORESTRY ACTIVITIES & WATER QUALITY IN ALABAMA: EFFECTS, RECOMMENDED PRACTICES ALABAMA AGRICULTURAL EXPERIMENT STATION, AUBURN UNIV, AL, BULLETIN 555 PAPER NO. 452 MULTIPLE	1979 I SOUTHERN MOUNTAINS STRY 3(3):68-76	1983 1ELD THROUGH FOREST PHACTICES IN W. WA/W. OR 183-393	,	1959 PECTING SEDIMENT MOVEMENT FROM LOGGING ROADS 12 10N -	UPT, HAROLD P.  A METHOD POR CONTROLLING SEDIMENT FROM LOGGING ROADS USFS INT MISCELLANEOUS PUBLICATION 22 PAPER NO. 674
PRACTICE	ET AL EWATER QUAI	ET AL STRUCTION IN APPLIED PORI MULTIPLE	TING WATER Y	,	ERISTICS APPECT 57(5):329-332 ROAD LOCATION	LING SEDIMER US PUBLICATI
CITATION	GOLDEN, MICHAEL S. FORESTRY ACTIVITIES & WATER QUALITY ALABAMA AGRICULTURAL EXPERIMENT STA PAPER NO. 452 MULTIPLE	GROVES, FRANKLIN D. ET AL TIMBER HAUL ROAD CONSTRUCTION IN SOUTHERN MOUNTAINS SOUTHERN JOURNAL OF APPLIED PORESTRY 3(3):68-76 PAPER NO. 652 MULTIPLE	HARR, R. DENNIS POTENTIAL FOR AUGMENTING WATER YIELD WATER RESOURCES BULLETIN 19(3):383-3	PAPER NO. 499	HAUPT, HAROLD P.  ROAD & SLOPE CHARACTERISTICS APPECTI JOURNAL OF FORESTRY 57(5):329-332 PAPER NO. 659 ROAD LOCATION	HAUPT, HAROLD P.  A METHOD FOR CONTHOLLING SEDIMENT FR USFS INT MISCELLANEOUS PUBLICATION 2 PAPER NO. 674

#### KOAD MODEL - CITATIONS FOR ALL REGIONS

CITATION	PRACTICE	RANGE TYPE	CONSTRUC- TION COST	MAINTEN- ANCE COST	CONSTRUCT	MAINTEN INCREMENT	ECONOMICS
HEEDE, BURCHARD H. OVERLAND FLOW 6. JOURNAL OF HYDRO PAPER NO. 548	SEDIMENT DELIVERY: LOGY 72:261-273 ROADS	1984 EXP WITH SMALL SUBDRAINAGE IN SW PONDEROSA FORESTED	N SW PONDEHOSA	,			
HIAWATHA NATIONAL FOREST POREST REPORT USPS REGION 9 PAPER NO. 687	POREST FOREST REPORT	1987		×		×	B, C, B/C
JACKSON, DAVID H. PREDICTING PORES WESTERN JOURNAL PAPER NO. 670	PREDICTING POREST ROAD AND BRIDGE CONSTRUCTION COSTS WESTERN JOURNAL OF APPLIED FORESTRY 1(3):76-79 PAPER NO. 670 MULTIPLE	1986 NSTRUCTION COSTS 1(3):76-79	×			,	v
KELLER, GORDON ROAD TIPS, A COME USPS ENGINEERING PAPER NO. 655	1985 ROAD TIPS, A COMPILATION OF REPORTS FROM THE ROAD TECHNOLOGY IMPROVEMENT PROGUSPS ENGINEERING STAFF, WASHINGTON, D.C. PAPER NO. 655 ROAD SURPACING	1985 THE ROAD TECHNOLOGY IMPR	OVEMENT PROG		×	×	,

OCHENDERFER, J. N. WENDEL, G. W. 1980 COSTS & ENVIRON IMPACTS OF HARVESTING TIMBER IN APPALACHIA WITH TRUCK-MOUNTED USFS NE-456 RESEARCH PAPER KOCHENDERFER, J. N.

LOGGING SYSTEM PAPER NO. 741

HELVEY, J. D. UNKWN CES SOIL LOSSES FROM MINIMUM-STANDARD FOREST ROADS RIMENT STATION, DRAPT ROAD SURPACING . LOGGING ROADS IN THE APPALACHIANS H PAPER ROAD LOCATION .	ET AL  N "MIN-STD" FOREST TRUCK RDS CONSTRUCTED CTRL APPALACHIANS  H PAPER  MULTIPLE  X	HELVEY, J. D SOIL LOSS & UTILITY EVALUATION OF FOREST ACCESS ROAD IN WV -1602-45 ROADS - FORESTED	CONSTRUC- MAINTEN- CONSTRUCT MAINTEN PRACTICE RANGE TYPE TION COST ANCE COST INCREMENT INCREMENT ECONOMICS
THE APPALACHIAN		EST.	ELVEY, J. D.  LOSS & UTILITY EVALUATION OF FOREST ACCESS R  15  DS  FORESTED  1-STD" FOREST TRUCK RDS CONSTRUCTED CTRL APPA  TIPLE  TIPLE  TIPLE  TELVEY, J. D.  UNKWN  STATION, DRAPT  DS SURFACING  -  Constructed the standard forest roads  To surfacing  The surfacing of the standard forest roads  The surfacing of the standard forest roads  The surfacing of the standard forest roads  The surfacing of the standard forest roads
KOCHENDERFER, JAMES N. EROSION CONTROL ON LOGGING ROADS IN USFS NE-158 RESEARCH PAPER PAPER NO. 662 ROAD LOCATION	KOCHENDERFER, J. N. GRAVEL GREATLY REDUCES SOIL LOSSES USFS NE FOREST EXPERIMENT STATION, PAPER NO. 667 ROAD SURPACI	ON " RCH P DUCES	

SEDIMENT YIELDS PROM ROADSIDES: APPLICATION OF UNIVERSAL SOIL LOSS EQUATION JOURNAL OF SOIL AND WATER CONSERVATION (NOV-DEC 1985):289-292 ET AL ROADS PAPER NO. 545 MEYER, G. J.

ASSESS ECON IMPLICATIONS OF MANAGING NONPT FORESTRY SOURCE OF WATER POLLUTANTS MASTER OF SCIENCE DEGREE, COLLEGE OF FORESTRY, UNIV OF MINNESOTA (OCTOBER) 1983 MULTIPLE MILES, PATRICK D. PAPER NO. 449

### ROAD MODEL - CITATIONS FOR ALL REGIONS

CITATION PRA	PRACTICE	RANGE TYPE	CONSTRUC- TION COST	MAINTEN- ANCE COST	CONSTRUCT	MAINTEN	ECONOMICS
OBERTS, GARY L. POLLUTANTS ASSOCIATED WITH SAND AND SA WATER RESOURCES BULLETIN 22(3):479-483 PAPER NO. 547 ROADS	TH SAND AND SALT APP 22(3):479-483 1DS	IPRTS, GARY L. POLLUTANTS ASSOCIATED WITH SAND AND SALT APPLIED TO ROADS IN MINNESOTA WATER RESOURCES BULLETIN 22(3):479-483 PAPER NO. 547 ROADS		·	·	·	,
				٠			
OTTAWA NATIONAL POREST FOREST REPORT USFS REGION 9		1987					
	POREST REPORT	•	×				В,С,В/С
PACKER, PAUL E. CRITERIA POR DESIGNING ANI POREST SCIENCE 13(1):2-18	ID LOCATING LOGGING	CKER, PAUL E. CRITERIA POR DESIGNING AND LOCATING LOGGING ROADS TO CONTROL SEDIMENT POREST SCIENCE 13(1):2-18					
PAPER NO. 649 MUL	MULTIPLE	•	×			1	
PRESCOTT NATIONAL POREST POLAND CREEK BRIDGE - STUDY SUMMARY AND WORKSHEET USPS REGION 3	IDY SUMMARY AND WORK	1987 KSHEET					
	POREST REPORT	•	×		×		•
ROBISON, M. HENRY HORMAECHEA, D. POTENTIAL EMPLOYMENT IMPACT OF ANADROI USFS PAYETTE NATIONAL FOREST, MCCALL, PAPER NO. 566 MULTIPLE	HORMAECHEA, DANIEL T. MPACT OP ANADROMOUS FIS FOREST, MCCALL, IDAHO MULTIPLE	PBISON, M. HENRY HORMAECHEA, DANIEL T. 1986 POTENTIAL EMPLOYMENT IMPACT OP ANADROMOUS FISH HABITAT MGT ON PAYETTE NATL FOR USFS PAYETTE NATIONAL FOREST, MCCALL, IDAHO PAPER NO. 566 "	NATL FOR				B.C

### HOAD MODEL - CITATIONS FOR ALL REGIONS

CITATION	PRACTICE RANGE TYPE	CONSTRUC- TION COST	MAINTEN- ANCE COST	CONSTRUCT	MAINTEN INCREMENT	ECONOBICS
SCHULTZ, BOB POCO CREEK RESTORATION PROJIUSFS PLUMAS NATIONAL POREST PAPER NO. 715 HABIT	HULTZ, BOB PLUMAS NATIONAL FOREST 1987 POCO CREEK RESTORATION PROJECT: BECKWOURTH RANGER DISTRICT USFS PLUMAS NATIONAL POREST PAPER NO. 715 HABITAT IMPROVEMENT	×	,			B, C, B/C
SESSIONS, JOHN CAN INCOME TAX RU WESTERN JOURNAL C PAPER NO. 672	1986 CAN INCOME TAX RULES APPECT MANAGEMENT STRATEGIES FOR FOHEST HOADS? WESTERN JOURNAL OF APPLIED PORESTRY 1(1):26-28 PAPER NO. 672	×	×	*	×	
STONE, EARL THE IMPACT OF TI USPS REPORT OF T PAPER NO. 497	ONE, EARL THE IMPACT OP TIMBER HARVEST ON SOILS AND WATER USPS REPORT OP THE PRESIDENT'S ADVISORY ON TIMBER & THE ENVIRONMENT, PAPER NO. 497 LOGGING SYSTEM	APR 1973	•	•		O
STOWELL, RICK A USERS GUIDE POR TH USFS NORTHERN REGION PAPER NO. 584	OWELL, RICK A USERS GUIDE FOR THE PISHSED HSI MODEL USFS NORTHERN REGION PAPER NO. 584 GENERAL STREAM	•	1			
SULLIVAN, KATHLEEN LONG-TERM PATTER WATER RESOURCES PAPER NO. 477	1985 N OP WTR QUAL IN MANAGED WATERSHED IN OR: 1. BULLETIN 21(6):977-987 LOGGING SYSTEM FORESTED	SUSPEND SEDIMENT				

	PRACTICE	RANGE TYPE	CONSTRUC-	MAINTEN- ANCE COST	CONSTRUCT	MAINTEN	ECONOMICS
SUPERIOR NATIONAL POREST - FLINTLOCK TIMBER SALE ROAD USPS SUPERIOR NATIONAL POREST PAPER NO. 710 FOREST	ONAL POREST - IMBER SALE ROAD OR NATIONAL POREST 10 POREST REPORT	1986	×	×	*	×	,
SUPERIOR NATIONAL POREST POREST POREST USPS REGION 9 PAPER NO. 685	. POREST POREST REPORT	1987	×		×	×	
SWIPT, L. W., JR. GRAVEL AND GRAS USPS SE, COWEET PAPER NO. 544	S SURPACING REDUCES SOI A HYDROLOGIC LAB ROADS	1982 L LOSS FROM MOUNTAIN ROADS			,		
SWIFT, LLOYD W., JR. PILTER STRIP WIDTH USPS SE FOREST EXP PAPER NO. 663	S POR POREST ROADS I ERIMENT STATION MULTIPLE	UNKWN N THE SOUTHERN APPALACHIANS			×	×	
TEW, HOWARD C. LAYMAN'S GUIDE TO I USDA SCS, PS, TVA. PAPER NO. 648	ET AL PRIVATE ACCESS ROAD COPIES AVAIL PROM MULTIPLE	1985 CONSTRUCTION IN SOUTHERN APPALACHIAN MTN LOCAL SOIL & WATER CONS DISTRICT OFPICES	ALACHIAN MTN RICT OFPICES X		ı		

### HOAD MODEL - CITATIONS FOR ALL REGIONS

CITATION	PRACT LCE	RANGE TYPE	CONSTRUC- TION COST	MAINTEN- ANCE COST	CONSTRUCT	MAINTEN INCREMENT	ECONOMICS
THIMBLE, GEORGE R., JR. WEITZMAN, SOIL EROSION ON LOGGING ROADS SOIL SCIENCE SOCIETY PROC:152-154 PAPER NO. 543 ROADS	IR. WEITZMAN, SIDNEY SGING ROADS  FY PROC:152-154 ROADS	1953					
TRIMBLE, GEORGE R., JR. SARTZ, RICH, HOW FAR FROM A STREAM SHOULD A LOGG JOURNAL OF PORESTRY 55(MAY):339-341 PAPER NO. 661	SARTZ, RICHARD SHOULD A LOGGING 5(MAY):339-341 ROAD LOCATION	S. 1957 ROAD BE LOCATED?				,	
USDA SOIL CONS SERVICE HAUL ROADS SOIL POTENTIAL RATINGS USDA SOIL CONSERVATION SERVICE, OI PAPER NO. 668	DA SOIL CONS SERVICE HAUL ROADS SOIL POTENTIAL RATINGS USDA SOIL CONSERVATION SERVICE, ORONO, MAINE PAPER NO. 668	1985	×		,		v
USFS ENGINEER STAPP (ED) ROAD TIPS, A COMPILATI USPS ENGINEERING STAPP PAPER NO. 669	ON OP REPORTS , WASHINGTON,	1985 FROM THE ROAD TECHNOLOGY IMPROVEMENT PROG D.C.	EMENT PROG	×	×	×	,
USFS NORTHEASTERN EXP STA FOREST HEPORT USFS NE FOREST EXPERIMENT STATION PAPER NO. 702 FOREST REPOI	XP STA (PERIMENT STATION FOREST REPORT	1986 WATEHSHED	×	×	×	×	в,с,в/с

CITATION	PRACTICE	RANGE TYPE	CONSTRUC-	MAINTEN- ANCE COST	CONSTRUCT	MAINTEN	ECONOMICS
USFS NORTHEASTERN REGION ECONOMIC ANALYSIS OF THE USFS NORTHEASTERN REGION PAPER NO. 708	HE COOPERATIVE ON POREST REPORT	1982 FOREST MANAGEMENT PROGRAM IN NEW YORK	y y or K	,		÷: •	
VARIOUS POREST REPORT CHATTAHOOCHEE-OCC PAPER NO. 682	RIOUS POREST REPORT CHATTAHOOCHEE-OCONEE NATIONAL FOREST, REGION PAPER NO. 682 POREST REPORT	1986 NO 8	×	×	×	×	В,С,В/С
WARRINGTON, GORDON E. ESTIMATING SOIL EROSION POR FORE USPS RM, PORT COLLINS, COLORADO PAPER NO. 542 MULTIPLE	ISION POR FOREST NS, COLORADO MULTIPLE	UNKWN LAND MANAGEMENT PLANNING: A PROCEDURE FORESTED	EDURE .				,
WILSON, C. N. PROCEDURE FOR DE USPS DIVISION OI PAPER NO. 720	LSON, C. N. PROCEDURE POR DETERMINING THE LEVEL OF SOII USPS DIVISION OF SOILS AND WATERSHED MANAGI PAPER NO. 720 SOIL-WATER ECONOMICS	1972 OF SOIL & WATER DAMAGE PREVENTION MEASURES D MANAGEMENT, REGION 9	ON MEASURES	•	•	ı	в,с,в/с

RATES OF LANDSLIDING AS IMPACTED BY TIMBER MGMT ACTIVITIES IN NW CALIFORNIA BULLETIN OP ASSOC OP ENGINEERING GEOLOGISTS XXIII(1):53-60

ROAD LOCATION

PAPER NO. 664

WILLIAMS, JOHN W.

WOLFE, MITCHELL D.

### HOAD MODEL - CITATIONS FOR ALL REGIONS

ECONOMICS				ı
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MAINTEN- CONSTRUCT MAINTEN ANCE COST INCREMENT INCREMENT				ŧ
MAINTEN- ANCE COST				,
CONSTRUC- TION COST				ı
	               	A REVIEW		
RANGE TYPE	NAMI	FOREST MANAGEMENT AND SEDIMENT PRODUCTION IN THE SOUTH - A REVIEW		FORESTED
		ODUCTION IN	TRY:27-35	TEM
CITATION PRACTICE		SEDIMENT PR	SOUTHERN JOURNAL OF APPLIED PORESTRY: 27-35	LOGGING SYSTEM
	S.	NAGEMENT AND	JOURNAL OF A	457
CITATION	YOHO, NOEL S.	FOREST MA	SOUTHERN	PAPER NO. 457

CITATIONS FOR TIMBER MODEL



CITATION	PRACTICE	STOCKING	SEED SAP GROWTH	POLE & SAW	GROWTH	G AND Y	ECONOMICS
ANDERSON, HENRY W. FORESTS & WATER: EPPECT OP POREST MGMT ON FLOODS, USFS PSW-18 GENERAL TECHNICAL REPORT PAPER NO. 719 GENERAL	1986 FLOODS, SEDIMENTATION & WATER SUPPLY GENERAL WATERSHED MGMT	MTER SUPPLY	,	,	,	,	,
ATKINSON, W. A. PACIFIC NW REGION PERTILIZATION PROJ, INTE 4TH NORTH AMERICAN FOREST SOILS CONP PROC: PAPER NO. 124	 Integrated approach to forest nutrition Proc:477-484 Fertilization	NUTRITION	· ×	,	,	,	,
ATZET, THOMAS AMARANTHUS, MIKE 1985 SOIL MOISTURE RETENTION PROGRAM USPS REGION 6, SISKIYOU NATIONAL FOREST R6-ECOL-209-1986 PAPER NO. 703 FOREST REPORT	1985 6-ECOL-209-1986 FOREST REPORT	,	×		•	•	,
BAILEY, ARTHUR W. HINES, WILLIAM W. VEGETATION-SOIL SURVEY OF WILDLIFE-PORESTRY RESEARCH AREA, OREGON STATE GAME COMMISSION, W-51-R, GAME REPORT 2 PAPER NO. 335		APPLICATION TO MGMT			,	,	
BARCLAY, H. J. SHAWN: A MODEL OP DOUG-PIR ECOSYSTEM RESPONSE TO N FENTILIZATION AND THINNING CANADIAN FORESTRY SERVICE, PACIFIC PORESTRY CENTRE, INFORMATION HPT BC-X-280 PAPER NO. 131	1986 RESPONSE TO N FENTILIZATION AND THINNING RESTRY CENTHE, INFORMATION HPT BC-X-280 FERTILIZATION	ID THINNING  BC-X-280	,			,	,

	PRACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y	ECONOMICS
BIGGER, C. MOLLIE COLE, DALE W. 1983  EFFECTS OF HARVESTING INTENSITY ON NUTRIENT LOSS AND FUTURE PRODUCTIVITY  USPS PNW-163 GENERAL TECHNICAL REPORT:167-178  PAPER NO. 136	E W. 1983 N NUTRIENT LOSS AND PUTURE PROPORT:167-178 LOGGING SYSTEM	ODUCTIVITY	*	,	,	,	
BROWN, GEORGE W.  EPPECTS OF CLEAR-CUTTING ON STREAM TEMPERATURE WATER RESOURCES RESEARCH 6(4):1133-1139 PAPER NO. 556 LOGGI	AAMES T. 1970 A TEMPEHATURE 3-1139 LOGGING SYSTEM	,	,		•	,	ı
CARMEAN, WILLARD H.  SITE QUALITY DOUG-PIR IN SW WA & RELATION TO PRECIP, ELEV, PHYS SOIL PROP  SOIL SCIENCE SOCIETY OF AMERICA PROC 18(1954):330-334  PAPER NO. 141	1954 RELATION TO PRECIP, ELEV, PHY:	S SOIL PROP	ı	t	ı	ı	ı
CARMEAN, WILLARD H. POREST SITE QUALITY EVALUATION IN THE UNITED STATES ADVANCES IN AGRONOMY 27(1975):209-269 PAPER NO. 232	1975 THE UNITED STATES -269	•	•		•	•	
CLAYTON, JAMES L. SOIL DISTURBANCE CAUSED BY CLEARCUTTING & HELICOPTER YARDING-IDAHO BATHOLITH USPS INT-305 RESEARCH NOTE PAPER NO. 119	1981 JTTING & HELICOPTER YARDING-11 LOGGING SYSTEM	оано ватносітн	,		•		,

CITATION	PRACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y TABLES	ECONOMICS
COLE, DANA W.  SKID TRAIL PRECONSTRUCTION; CASE STUDY OF LOGGING IMPACTS & PRODUCTIVITY  CA DEPT PORESTRY, PORESTRY NOTE #86 (MAY 1983)  PAPER NO. 128	1983  NY 1983) SKID TRAILS	YTIV.	,	,			
DISSMEYER, GEORGE E. FOSTER, BENNETT SOME ECONOMIC BENEFITS OF PROTECTING WA USFS SO-65 GENERAL TECHNICAL REPORT PAPER NO. 289	TT MATER QUALITY (IN A PROCEEDINGS) MULTIPLE	â -	×				B,C,B/C,IRR
DYRNESS, C. T. SOIL SURPACE CONDITIONS POLLOWING SKYLINE LOGGING USPS PNW-55 RESEARCH NOTE PAPER NO. 121 LOGGING	1967 INE LOGGING LOGGING SYSTEM	1		,		,	
DYRNESS, C. T. SOIL SURPACE CONDITIONS FOLLOWING BALLOON LOGGING USPS PNW-182 RESEARCH NOTE PAPER NO. 120	1972 DON LOGGING LOGGING SYSTEM	,			,		,
ENTRY, JAMES A.  EFPECT OF TIMBER HARVESTING ON MICROBIAL BIOMASS PLUXES CANADIAN JOURNAL OF POREST RESEARCH 16(1986):1076-1081 PAPER NO. 285	1986 NL BIOMASS PLUXES IN NORTHERN ROCKY MTN (1986):1076-1081 LOGGING SYSTEM	ROCKY MTN					

	PRACTICE	STOCKING	SEED SAP GROWTH	POLE & SAW	GROWTH	G AND Y TABLES	ECONOMICS
FELLER, M. C.  FORCYTE-10: CALIB DATA & SIMUL OF POTENTIAL LONG-TERM EFFECT INTENSIVE FOR MGT USFS PNW-163 GENERAL TECHNICAL REPORT  PAPER NO. 145	1983 VTIAL LONG-TERM EFFECT INTENS	IVE FOR MGT			,	×	B/C
FELLER, M. C.  EPFECTS CLEARCUT/SLASH BURNING ON STREA WATER RESOURCES RESEARCH 20(1):29-40 PAPER NO. 478	P. REAMWATER CHEM & WATERSHED NUTRIENT ) LOGGING SYSTEM	IENT BUDGET			•		ı
FISKE, JOHN N.  ESTIM EPPECT OP COMPETING PLANTS ON CONIFER GRWTH/YIELD-D 6TH ANNUAL POREST VEGETATION MANAGEMENT CONF PROC:129-143 PAPER NO. 249  COMPETITOR CONTR	1984 CONIFER GRWTH/YIELD-DETERMIN RELEASE NEEDS IENT CONF PROC:129-143 COMPETITOR CONTROL	LEASE NEEDS		ı	,	,	ı
FREDRIKSEN, R. L. EROSION & SEDIMENT POLLOW ROAD CONSTRUCT/TIMBER HARVEST UNSTABLE USFS PNW-104 RESEARCH PAPER PAPER NO. 665		SOILSW. OR	,		,	ı	
FREDRIKSEN, R. L. IMPACT TIMBER HARVEST, PERTIL & HERBICIDE TREAT ON 4TH NORTH AMERICAN FOREST SOILS CONF PROC:283-313 PAPER NO. 479 LOGGING S'	1973 CIDE TREAT ON STREAMWATER QUAL: W OR PROC:283-313 LOGGING SYSTEM	W OR & WA	ı		ı		,

CITATION	PRACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y	ECONOMICS
FROEHLICH, H. A. MCNABB, D. H. MINIMIZING SOIL COMPACTION IN PACIFIC 6TH NORTH AMERICAN POREST SOILS CONF PAPER NO. 114	MCNABB, D. H. 1984  ION IN PACIFIC NORTHWEST FORESTS  ST SOILS CONP PROC:159-192  SKID TRAILS	,	×			,	
FROEHLICH, HENRY A.  EFFECT OF SOIL COMPACTION BY LOGGING ON FORE BLM, CONTRACT # 53500-CT4-5(N), PORTLAND, OR PAPER NO. 127	UNKWN ON BY LOGGING ON FOREST PRODUCTIVITY T4-5(N), PORTLAND, OR SKID TRAILS		×	×	ı		
GESSEL, S. P. USE OF FERTILIZERS IN SUSTAINED PRODI 6TH NORTH AMERICAN FOREST SOILS CONP PAPER NO. 115	SSEL, S. P. USE OF FERTILIZERS IN SUSTAINED PRODUCTIVITY OF DOUGLAS-FIR FORESTS 6TH NORTH AMERICAN FOREST SOILS CONP PROC:67-87 PAPER NO. 115	ESTS .	,		×	,	B, C, B/C
GESSEL, STANLEY P. LLOYD, WILLIA EFFECT OF SOME PHYSICAL SOIL PROPERTI JOURNAL OF FORESTRY 48(6):405-410 PAPER NO. 140	LLOYD, WILLIAM J. SOIL PROPERTIES ON DOUGLAS-PIR SITE QUALITY 6):405-410	, YTI.1					,
GILLICK, THOMAS SCOTT, BILLY BUFPER STRIPS AND THE PROTECTION OF STATE OF WASHINGTON, DEPT OF NATURAL PAPER NO. 580	LLICK, THOMAS SCOTT, BILLY DEAN 1975 BUFPER STRIPS AND THE PROTECTION OP PISHERY RESOURCES: AN ECONOMIC ANALYSIS STATE OF WASHINGTON, DEPT OP NATURAL RESOURCES, DNR REPORT 32 PAPER NO. 580	MIC ANALYSIS		,			B, C, B/C

PRACTICE	STOCKING	SEED SAP GROWTH	POLE & SAW	GROWTH	G AND Y TABLES	ECONOMICS
GORDON, JOHN C.  DURYEA, MARY L.  INCREASING FOREST PRODUCTIVITY & VALUE THROUGH IMPROVED REGENERATION PRACTICES FOREST POTENTIALS - WEYERHAEUSER SCIENCE SYMPOSIUM (1984):131-145 PAPER NO. 135	ON PRACTICES	×		r	:	1
HARVEY, A. E.  EFFECTS OF SOIL ORGANIC MATTER ON REGENERATION IN NORTHERN ROCKY MTN FORESTS USFS PNW-163 GENERAL TECHNICAL REPORT:239-242  PAPER NO. 132	ITN FORESTS	×	ı	ı		ı
1983 SOIL COMPACTION AND STAND GROWTH, PINAL REPORT TO USDA FOREST SERVICE USFS AMENDMENT TO SUPPLEMENT 42, MASTER AGREEMENT 21-395 PAPER NO. 134	VICE -	×	,	×	,	•
HIBBERT, ALDEN R. MANAGING VEGETATION TO INCREASE FLOW IN THE COLORADO RIVER BASIN USFS RM-66 GENERAL TECHNICAL REPORT PAPER NO. 510	,	,		,	•	ů ď
1975 IMPACT OF PIVE POSTFIRE SALVAGE LOGGING SYSTEMS ON SOILS AND VEGETATION JOURNAL OF SOIL AND WATER CONSERVATION 30(2):78-81 PAPER NO. 113	ETATION		•			,

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KNAPP, WALTER H.  VEGETATION CONTROL POR DOUGLAS-FIR REGENERATION ON JOURNAL OF FORESTRY 82(3):168-173  PAPER NO. 133	1984 ENERATION ON SIUSLAW NATIONAL FOREST	L FOREST	,	-		,	U
LEAF, CHARLES F. WATERSHED MANAGEMENT IN ROCKY MOUNTAIN USFS RM-137 RESEARCH PAPER PAPER NO. 726	1975 N SUBALPINE ZONE: STATUS OF OUR KNOWLEDGE GENERAL WATERSHED MGMT	OUR KNOWLEDGI	, W	,			,
LEMMON, PAUL E. FACTORS APPECT PRODUCTIVITY OF SOME LA JOURNAL OP FORESTRY 53(5):323-330 PAPER NO. 143	1955 LANDS IN WILLAMETTE BASIN OF OR: DOUG-FIR	OR: DOUG-FIR		ı	•	i	,
MCDONALD, PHILIP M. GRASSES IN YOUNG CONIFER PLANTATIONS NORTHWEST SCIENCE 60(4):271-278 PAPER NO. 367	1986 - HINDRANCE AND HELP VEGETATIVE MGMT		×	×		ı	ı
MCKAY, NEIL A STOCKABILITY EQUATION FOR FOREST LA USFS PNW-435 RESEARCH NOTE PAPER NO. 274	1985 LAND IN SISKIYOU COUNTY, CALIFORNIA	FORNIA	ı		,		,

CITATION	PRACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y	ECONOMICS
MCLEAN, ALASTAIR PRODUCING PORAGE POR LIVESTOCK ON F OR ST UNIV, COLLEGE OF AGR SCI, SYM PAPER NO. 382	TOCK ON FOREST RANGES SCI, SYMP SERIES 2. TIMBER PRESS, BEAVERTON:175-183 VEGETATIVE MGMT	BEAVERTON:175-183	*	,		,	
MCLEAN, ALASTAIR CLASSIPICATION AND MANAGEMENT OP TH FORESTLAND GRAZING, SYMPOSIUM PROC, PAPER NO. 397	1983 ENT OF THE DOUGLAS-PIR-PINEGRASS REGION IUM PROC, WASHINGTON STATE UNIV EXTENSION	GION ENSION SVC:15-18		,		•	
MILES, SCOTT R. FERTILIZING CALIPORNIA FORESTS WITH USFS, REGION 5, (NOVEMBER 1983) PAPER NO. 77	POWERS, ROBERT F. 1983 ORESTS WITH NITROGEN PRELIMINARY GUIDELINES R 1983) FERTILIZATION	GUIDELINES			•		В, С, В/С
MILLER, RICHARD E. COMPARATIVE EFFECTS OP 3 N FERTILIZ CANADIAN JOURNAL OP FOREST RESEARCH PAPER NO. 117	LLER, RICHARD E. ET AL COMPARATIVE EFFECTS OF 3 N FERTILIZERS APPLIED IN FALL/SPRG TO 29-YR DOUG-PIR CANADIAN JOURNAL OF POREST RESEARCH 16(1986):910-917 PAPER NO. 117	o 29-YR DOUG-PIR -		,	ı		,
MONSERUD, ROBERT A. HEIGHT GROWTH/SITE INDEX CURVES FOR FOREST SCIENCE 30(4):943-965 PAPER NO. 137	1984 URVES POR INLAND DOUG-FIR BASED ON STEM ANALY DATA 65	STEM ANALY DATA			×		,

CITATION	PRACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y	ECONOMICS
MONSERUD, ROBERT A.  COMPARISON OF DOUGLAS-PIR SITE INDEX & HEIGHT GROWT  CANADIAN JOURNAL OF POREST RESEARCH 15(4-6):673-679  PAPER NO. 138	1985 & HEIGHT GROWTH CURVES IN PACIFIC NW 5(4-6):673-679	LPIC NW	,	,	×	,	
NEWMAN, HOWARD C. SCHMIDT, WYMAN C. SILVICULTURE AND RESIDUE TREATMENTS APFECT WATER USED BY USFS INT-90 GENERAL TECHNICAL REPORT PAPER NO. 496		A LARCH/PIR FOREST		r	ı		
PETERSON, C. E., JR. GESSEL, S. P. 1983 FOREST PERTILIZATION IN PACIPIC NW: RESULTS OF REGIONAL USFS PNW-163 GENERAL TECHNICAL REPORT PAPER NO. 123	1983 SULTS OP REGIONAL FOREST NUT FERTILIZATION	FOREST NUTRITION PROJ	×	×			,
POWERS, ROBERT P. POREST PERTILIZATION RESEARCH IN CALIFORNIA USFS PNW-163 GENERAL TECHNICAL REPORT PAPER NO. 84	1983 ORNIA FERTILIZATION	•	×	×	,		,
RADWAN, M. A. SITE INDEX & SELECTED SOIL PROPERTIES IN RELATION 6TH NORTH AMERICAN FOREST SOILS CONP PROC:89-104 PAPER NO. 111	IN RELATION TO RESPONSE OF DOUGLAS-FIR PROC:89-104 FERTILIZATION	OOUGLAS-FIR		,			

		STOCKING	SEED SAP	POLE	GROWTH	G AND Y	
CITATION	PRACTICE	LEVEL	GROWTH	& SAW	CURVES	TABLES	ECONOMICS
RICH, LOWELL R. THOMPSON, J. R. 1974 WATERSHED MANAGEMENT IN ARIZONA'S MIXED CONIFER FORESTS: USFS RM-130 RESEARCH PAPER	STATUS OF	OUR KNOWLED		 		 	1
PAPER NO. 727	GENERAL WATERSHED MGMT	ı		•	,	•	,
SCHMIDT, WYMAN C. UNDERSTORY VEGETATION RESPONSE TO HARVEST & USFS INT-90 GENERAL TECHNICAL REPORT:221-248	1979 ST & RESIDUE MGMT IN LARCH/FIR FOREST 1-248	FIR FOREST					
PAPER NO. 357	VEGETATIVE MGMT	r	ı	ı		ı	ı
SEDELL, JAMES R. IMPORTANCE OF STREAMSIDE FORESTS TO LARGE COPIES AVAILABLE UPON REQUEST	DITH L. 1984 LARGE RIVERS: INSOLATION WILLAMETTE	METTE RVR					
PAPER NO. 606				t	,	t	ı
SHARROW, S. H.  SHEEP AS A SILVICULTURAL TOOL IN COASTAL BOUGLAS-FIR FOREST  OBEGIN OF HAIV AGE SCIENCES SYMBOSTIM SERVES #2 BOOMITTE FOR BOOK PAGES	1983 L DOUGLAS-FIR FOREST						
PAPER NO. 126	COMPETITOR CONTROL	CODY FOREST	,	ŧ	ŧ	,	,
SIDLE, R. C. SOIL COMPACTION PROM LOGGING WITH LOW-GROUND PRESSURE SKIDDER IN OREGON COAST SOIL SCIENCE SOCIETY OF AMERICA JOURNAL 45(1981):1210-1224	1981 YOUND PRESSURE SKIDDER IN OR 45(1981):1219-1224	REGON COAST					
PAPER NO. 118	SKID TRAILS	,	ı		Ł	ŧ	ı

CITATION	PRACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y	ECONOMICS
SMITH, R. B. 1980 TREE GROWTH ON SKIDROADS ON STEEP SLOPES LOGGED AFTER WILDFIRES-BRIT. CANADIAN FORESTRY SERVICE, PACIFIC FOREST RESEARCH CENTRE (NOV. 1980) PAPER NO. 116 SKID TRAILS	PES LOGGED AFTER WILDFIRES-BRIT.COLUMBIA REST RESEARCH CENTKE (NOV. 1980) SKID TRAILS X	181T.COLUMBIA 980) X					,
STEINBRENNER, E. C. INPLUENCE INDIVIDUAL SOIL & PHYSIOGRAPI 2ND NORTH AMERICAN POREST SOILS CONP PI PAPER NO. 139	1963 PHIC FACTORS ON SITE INDEX OF DOUGLAS-FIR PROC:261-277	P DOUGLAS-FIR		•	ı	,	ı
STEWART, RONALD (COMPILER ET AL EPPECTS OP COMPETING VEGETATION ON FOREST USPS WO-43 GENERAL TECHNICAL REPORT PAPER NO. 300	1984 EST TREES: A BIBLIOGRAPHY WITH ABSTRACTS COMPETITOR CONTROL X	IITH ABSTRACTS X	×	×	×	×	в, с
SULLIVAN, KATHLEEN LONG-TERM PATTERN OP WTR QUAL IN MANAGED WATERSHED IN OR: WATER RESOURCES BULLETIN 21(6):977-987 PAPER NO. 477 LOGGING SYSTEM	i.	SUSPEND SEDIMENT				1	,
TAPPEINER II, J. C. ET AL PART 2, PACIFIC COAST, THE NEXT 30 YEARS JOURNAL OF PORESTRY 84(5):37-46 PAPER NO. 248	1986 - SILVICULTURE - MULTIPLE	THE PAST 30 YEARS				•	

CITATION	PRACTICE	STOCKING	SEED SAP GROWTH	POLE & SAW	GROWTH	G AND Y TABLES	ECONOMICS
TIEDEMANN, ARTHUR R. KLOCK, GLEN O. 1ST-YR VEG AFTER FIRE, RESEEDING, FERTILIZATION USFS PNW-195 RESEARCH NOTE PAPER NO. 130	GLEN O. 1973 NG, PERTILIZATION ON ENTIAT EXPERIMENTAL FOREST MULTIPLE	IMENTAL FOREST		•	,		•
TURNER, JOHN S NUTRITION OF CONIFER RELATION TO R 5TH NORTH AMERICAN FOREST SOILS CONF PAPER NO. 122	RNER, JOHN LAMBERT, MARCIA J. S NUTRITION OF CONIFER RELATION TO RESPONSE TO FERTILIZER N, FUNGAL INFECTIONS 5TH NORTH AMERICAN POREST SOILS CONF PROC:546-563 PAPER NO. 122	UNGAL INFECTIONS	,	×	,	•	
UNIV. OF WASHINGTON FOREST RESOURCES COLLEGE REGIONAL FOREST NUTRITION RESEARCH PROJECT - BIENI INSTITUTE OF FOREST RESOURCES CONTRIBUTION NO. 46 PAPER NO. 112	IV. OF WASHINGTON FOREST RESOURCES COLLEGE 1982 REGIONAL FOREST NUTRITION RESEARCH PROJECT - BIENNIAL REPORT 1980-1982 INSTITUTE OF FOREST RESOURCES CONTRIBUTION NO. 46 PAPER NO. 112	980-1982 x	×	×	×	×	B, C, B/C
WERT, STEVE  EFFECTS OF SKID ROADS ON DIAMETER, HEIGHT, VOLUME of SOIL SCIENCE SOCIETY OF AMERICA JOURNAL 45:629-632 PAPER NO. 125	THOMAS, BYRON R. DIAMETER, HEIGHT, VOLUME GROWTH IN DOUGLAS-FIRAMERICA JOURNAL 45:629-632 SKID TRAILS	OUGLAS-FIR	×	×	×	•	
WILLIAMSON, R. L. GROWTH AND YIELD RECORDS PRO USFS PNW-4 RESEARCH PAPER PAPER NO. 144	1963 GROWTH AND YIELD RECORDS PROM WELL-STOCKED STANDS OF DOUGLAS-FIR USFS PNW-4 RESEARCH PAPER			T.		,	,

CITATION	PRACTICE	STOCKING	SEED SAP GROWTH	POLE & SAW	GROWTH	GROWTH G AND Y CURVES TABLES	ECONOMICS
WOOLDRIDGE, DAVID D. WATERSHED DISTURBANCE FROM TRACTOR AND JOURNAL OF PORESTRY 58(5):369-372	1980 SKYLINE CRANE LOGGING						
PAPER NO. 129	LOGGING SYSTEM	ı		,	,	:	ı
ZINKE, PAUL J. SITE QUALITY DOUG-FIR/PONDEROSA PINE II SOCIETY OP AMERICAN FORESTERS MEETING	1958 IN NW CA AS RELATED TO CLIMATE, TOPO,SOIL PROC (1958):167-171	, TOPO, SOIL					
PAPER NO. 142				,	1	i	,



#### TIMBER MODEL - CITATIONS FOR JACK PINE

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP	POLE & SAW	GROWTH	G AND Y	ECONOMICS
ARMSON, K. A.  PERTILIZATION RESPONSE IN THE NORTHERN CONIFEROUS 4TH NORTH AMERICAN FOREST SOILS CONF PROC:449-466 PAPER NO. 265  FERTILIZ	1975 RN CONIFEROUS FOREST PROC:449-466 FERTILIZATION	,	,	×	,	ı	,
BENZIE, JOHN W. JACK PINE IN THE NORTH CENTRAL STATES USFS NC-32 GENERAL TECHNICAL REPORT PAPER NO. 203	s MULTIPLE	×	×		×	×	
BUCHMAN, ROLAND G. SURVIVAL PREDICTIONS FOR MAJOR LAKE STATES TREE USFS NC-233 RESEARCH PAPER PAPER NO. 212	1983 STATES TREE SPECIES	×	×	,			,
CARMEAN, WILLARD H.  FOREST SITE QUALITY EVALUATION IN THE ADVANCES IN AGRONOMY 27(1975):209-269 PAPER NO. 232	1975 E UNITED STATES 9		,	,			,
FOSTER, N. W.  NITROGEN RELEASE FROM UREA & SULFUR-COATED UREA IN JACK PINE FOREST HUMUS SOIL SCIENCE SOCIETY OF AMERICA JOURNAL 50(1):226-229  PAPER NO. 204	. G. COATED UREA IN JACK PINE FO NAL 50(1):226-229 FERTILIZATION	REST HUMUS	,				υ

#### TIMBER MODEL - CITATIONS FOR JACK PINE

PRACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y TABLES	ECONOMICS
RAWINSKI, JOHN J. ET AL SOLL PROPERTIES RELATED TO CONIPEROUS SEEDLING HEIGHT GROWTH IN N. USFS NC-254 RESEARCH NOTE PAPER NO. 213	WISCONSIN	×	•		,	
ROSE, DIETMAR W. TIMBER INVESTMENT OPPORTUNITIES IN JACK PINE TYPE OP NORTHWESTERN WISCONSINUNIV OF WISCONSIN, SCHOOL OP NATURAL RESOURCES, FORESTRY RESEARCH NOTES 175	WISCONSIN NOTES 175		,	•	,	B
SANDER, IVAN L. OAKS IN THE NORTH CENTRAL STATES USFS NC-37 GENERAL TECHNICAL REPORT PAPER NO. 187	×	×		×	×	,
ST. CLAIR, JOHN BRADLEY ECONOMIC EVALUATION OP LAKE STATES TREE IMPROVEMENT PROGRAMS MASTERS THESIS, UNIV OP WISCONSIN-MADISON PAPER NO. 223			,	•		B,C,B/C,IRR
STEWART, RONALD (COMPILER ET AL EFFECTS OP COMPETING VEGETATION ON FOREST TREES: A BIBLIOGRAPHY WITH ABSTRACTS USFS WO-43 GENERAL TECHNICAL REPORT COMPETITOR CONTROL X	WITH ABSTRAC X	S L:	×	*	×	В, С

#### TIMBER MODEL - CITATIONS FOR JACK PINE

CITATION	PRACTICE	STOCKING	SEED SAP GROWTH	POLE & SAW	GROWTH	G AND Y	ECONOMICS
SUPERIOR NATIONAL POREST FOREST REPORT USFS REGION 9 PAPER NO. 685	1987 FOREST REPORT	,		,		:	
TIMMER, V. R. PREDICTING PERTILIZER GROWTH RESPONSE & 6TH NORTH AMERICAN POREST SOILS CONF PROPAPER NO. 205	1984 <b>4.</b> NUTRIENT STATUS OF JACK PINE BY FOLIAR PROC (JUNE 1983):335-351 FERTILIZATION	E BY POLIAR		×			
WILDE, S. A. THE RELATION OF SOILS AND POREST VEGETATION OF THE ECOLOGY XIV(2):94-105 PAPER NO. 288	1933 FION OP THE LAKE STATES REGION	N '	,	,	1	,	,
WILDE, S. A.  THE SOIL-AMELIORATING EFFECT OP JACK PINE AND RED PINE P RECENT ADVANCES IN BOTANY, UNIV OF TORONTO PRESS, CANADA PAPER NO. 218	1961 PINE AND RED PINE PLANTATIONS RONTO PRESS, CANADA	,	,		1	,	,
WILDE, S. A. SOILS AND FOREST GROWTH: THEIR RELATIONSHIP IN TERMS OF REGRESSION ANALYSIS BIO SCIENCE (JAN 15, 1970):101-102 PAPER NO. 206	1970 SHIP IN TERMS OF REGRESSION /	ANALYSIS			,		

TIMBER MODEL - CITATIONS FOR JACK PINE

	ECONOMICS					
Y QV	TABLES EC	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				ŧ
G AND Y	TABI					,
GROWTH	CURVES					ì
POLE	& SAW					ı
SEED SAP	GROWTH					
STOCKING	LEVEL					,
	PRACTICE		1970	GROWTH POTENTIAL OF WISCONSIN NATIVE PINES ON WEED-INVADED SOILS	WISCONSIN ACADEMY OF SCIENCES, ARTS & LETTERS 58(1970):197-202	*
	CITATION		WILDE, S. A.	GROWTH POTENTIAL OF WISCONSIN N	WISCONSIN ACADEMY OF SCIENCES,	PAPER NO. 216

STOCKING SEED SAP POLE GROWTH G AND Y LEVEL GROWTH & SAW CURVES TABLES ECONOMICS	W., JR. 1980 FOR GROWTH PREDICTIONS IN LOBLOLLY PINE SILVICULTURAL RESEARCH CONP PROC:175-178 X	1982 C STATE FOREST FERT COOP IVITY: 379-384 X X X X	1983 REPORT # 14 ION	985 ERICAN FORESTERS ON
CITATION	ALLEN, H. LEE  WHAT MEASURE OF STAND DENSITY IS BEST FOR GROWTH PREDIUSFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL REPAPER NO. 46	ALLEN, H. LEE  NUTRITION MGT LOBLOLLY PINE STANDS: STATUS RPT OF NC STATE FOREST FERT COOP  IUFRO SYMPOSIUM ON FOREST SITE & CONTINUOUS PRODUCTIVITY:379-384  PAPER NO. 25  FERTILIZATION  X .	ALLEN, H. LEE BALLARD, RUSS FOREST FERTILIZATION OF LOBLOLLY PINE N. CAROLINA STATE FOREST PERTILIZATION COOPERATIVE, REPORT # PAPER NO. 4  PERTILIZATION	ALLEN, H. LEE THE VALUE OF PERTILIZATION AS A SILVICULTURAL TOOL 64TH ANNUAL MEETING OF THE APPALACHIAN SOCIETY OF AMERICAN FORESTERS PAPER NO. 752

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USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONP PROC:169-174 GROWTH & YIELD PREDICTIONS POR LOBLOLLY PINE-COOP RESEARCH PROGRAM AT VA TECH

MULTIPLE

1980

BURKHART, HAROLD E.

AMATEIS, RALPH L.

PAPER NO. 69

CITATION	PRACTICE	STOCKING	SEED SAP GROWTH	POLE & SAW	GROWTH	G AND Y	ECONOMICS
AMATEIS, RALPH L. BURKHART, HA SITE INDEX CURVES FOR LOBLOLLY PINE SOUTHERN JOURNAL OF APPLIED FORESTRY PAPER NO. 61	IROLD E. 1985 PLANTATIONS ON CUTOVER (9(3):166-169 SITE PREPARATION	SITE-PREP LANDS	,	, ,	×		
ANDERSON, HENRY W. ET AL PORESTS & WATER: EPFECT OF POREST MGMT ON PLOODS, USPS PSW-18 GENERAL TECHNICAL REPORT PAPER NO. 719	MT ON PLOODS,	1986 SEDIMENTATION & WATER SUPPLY JATERSHED MGMT					
ARBOUR, STEVEN J.  EPFECT OF MECHANICAL SITE PREP TREAT USPS SO-34 GTR, 1ST BIENNIAL SOUTHER PAPER NO. 60	BOUR, STEVEN J. EZELL, ANDREW W. 1980 EPFECT OF MECHANICAL SITE PREP TREAT ON HEIGHT GROWTH LOBLOLLY E TX SANDY SOILUSFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:96-99 PAPER NO. 60	E TX SANDY SOIL	×		×	•	
ASKEW, G. R. WATER QUALITY CHANGES DUE TO SITE CC SOUTHERN JOURNAL OP APPLIED FORESTRY PAPER NO. 528	KEW, G. R. WILLIAMS, T. M. WATER QUALITY CHANGES DUE TO SITE CONVERSION IN COASTAL SOUTH CAROLINA SOUTHERN JOURNAL OF APPLIED PORESTRY 10(1986):134-136 PAPER NO. 528 VEGETATIVE MGMT	CAROLINA -	,	ı			
BALLARD, R. THINNING AND PERTILIZATION USPS SO-34 GTR, 1ST BIENN PAPER NO. 19	LLARD, R. THINNING AND FERTILIZATION OF LOBLOLLY PINE PLANTATIONS USPS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:100-104 PAPER NO. 19	ONF PROC:100-104		×			

CITATION	PRACTICE	STOCKING	SEED SAP GROWTH	POLE & SAW	GROWTH	G AND Y	ECONOMICS
BALLARD, R.  N PERTIL OF ESTABLISHED LOBLOLLY PINE USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN PAPER NO. 20	1980 IE STANDS: FLEXIBLE SILVICULTURAL TECHNIQUE IN SILVICULTURAL RESEARCH CONP PROC:223-229 FERTILIZATION	AL TECHNIQUE PROC:223-229 X	,	×	,		U
BALMER, WILLIAM E. WILLISTON, HAMLIN L. EARLY CONSIDERATIONS IN PINE MANAGEMENT USPS FOREST MANAGEMENT BULLETIN, SE AREA (OCTOBER) PAPER NO. 10	AMLIN L. 1975 IENT AREA (OCTOBER) MULTIPLE	,	×	,	,		,
BEASLEY, R. SCOTT SEDIMENT LOSSES FROM FOREST PRACTICES USFS SE-24 GTR, 2ND BIENNIAL SOUTHERN PAPER NO. 465	FREDO B. 1982 SIN THE GULF COASTAL PLAIN OF ARKANSAS IN SILVICULTURAL RESEARCH CONF PROC:461-467 LOGGING SYSTEM	ARKANSAS PROC: 461-467 -	,	,			,
BLAIR, ROBERT M. FORAGE PRODUCTION APTER HARDWOOD CONT FOREST SCIENCE 17(3):279-284 PAPER NO. 310	1971 ITROL IN A SOUTHERN PINE-HARDWOOD STAND RANGE REHABILITATION X	OD STAND	×	,			
BRENDEMUEHL, R. H. OPTIONS FOR MANAGEMENT OP SANDHILL POREST LAND SOUTHERN JOURNAL OP APPLIED FORESTRY 5(4):216- PAPER NO. 254	1981 OREST LAND '5(4):216-222	1		•			

CITATION	PRACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y	ECONOMICS
BURKHART, HAROLD E. ET AL YIELD RELATION IN UNTHINNED LOBLOLLY PL. SOUTHERN JOURNAL OF APPLIED FORESTRY 9(3) PAPER NO. 39	1985 PLANTATIONS ON CUTOVER, SITE-PREP LANDS 9(2):81-91 SITE PREPARATION	E-PREP LANDS	×	,	,	×	,
CAIN, MICHAEL D.  JAPANESE HONEYSUCKLE/ASSOC GROUND COVER INHIBIT ESTAB & GROWTH PINE SEEDLINGS USFS SO-54 GTR, 3RD BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:300-304 PAPER NO. 56	1984 I INHIBIT ESTAB & GROWTH P ILVICULTURAL RESEARCH CON COMPETITOR CONTROL	INE SEEDLINGS IP PROC: 300-304	×		•	,	,
CAMPBELL, T. E. SPOT SEEDING IS EPPECTIVE AND INEXPENSIVE FOR REFORESTING SMALL ACREAGES USPS SO-34 GTR, IST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONP PROC:50-53 PAPER NO. 47	1980 VE FOR REFORESTING SMALL ILVICULTURAL RESEARCH CON	ACREAGES IP PROC:50-53 X	×	•	,	,	•
CARMEAN, WILLARD H.  FOREST SITE QUALITY EVALUATION IN THE UNITED ADVANCES IN AGRONOMY 27(1975):209-269  PAPER NO. 232	1975 INITED STATES	,		ı	,		
CARTER, M. C. IMPACT OF CHEMICAL AND MECHANICAL SITE PREPARATION ON WILDLIFE HABITAT 4TH NORTH AMERICAN FOREST SOILS CONF PROC:323-332 PAPER NO. 344	1975 E PREPARATION ON WILDLIPE H PROC:323-332 SITE PREPARATION	ABITAT X	×	ı	,	,	,

CITATION	PRACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y	ECONOMICS
COILE, T. S. SCHUMACHER RELATION OF SOIL PROPERTIES TO SIT JOURNAL OF FORESTRY 51(10):739-744 PAPER NO. 64	ILE, T. S. SCHUMACHER, P. X. 1953  RELATION OF SOIL PROPERTIES TO SITE INDEX OF LOBLOLLY & SHORTLEAP IN PIEDMONT JOURNAL OF FORESTRY 51(10):739-744  PAPER NO. 64	IN PIEDMONT	,	,	×	,	,
COMERPORD, N. B.  ADVANCES IN POREST FERTILIZATION ON THUSPS PNW-163 GENERAL TECHNICAL REPORT PAPER NO. 160	MERFORD, N. B. ET AL ADVANCES IN POREST PERTILIZATION ON THE SE COASTAL PLAIN USPS PNW-163 GENERAL TECHNICAL REPORT (DEC 1983):370-378 PAPER NO. 160 PAPER NO. 160	,	×	×	,		,
CRUTCHFIELD, DOUGLAS M.  PERTILIZATION - EPPECT ON PRODUCTIVITY!  WESTVACO CORP, GEORGETOWN, SOUTH CAROLINA  PAPER NO. 26	UNKWN N PRODUCTIVITY! N, SOUTH CAROLINA PERTILIZATION	×	×	×	ı		в. с
DERR, H. J. SITE PREPARATION IMPROVES GROWTH OF PIUSFS SO RESEARCH NOTE PAPER NO. 166	MANN, W. F., JR. S GROWTH OF PLANTED PINES SITE PREPARATION		×		,		,
DEWIT, JAMES N.  SITE PREP EPPECTS EARLY LOBLOLLY GRWT! USPS SE-24 GTR, 2ND BIENNIAL SOUTHERN PAPER NO. 62	WIT, JAMES N. SITE PREP EPPECTS EARLY LOBLOLLY GRWTH/HRDWD COMPETITION & SOIL PHYSICAL PROPUSPS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONP PROC:40-47	HYSICAL PROP PROC:40-47	,		×		

CITATION	PRACTICE	STOCKING	SEED SAP GROWTH	POLE & SAW	GROWTH	G AND Y TABLES	ECONOMICS
DICKERSON, B. P.  SOIL COMPACTION AFTER TREE-LENGTH SKIDDING IN NORTHERN MISSISSIPPI SOIL SCIENCE SOCIETY OF AMERICA JOURNAL 40(6):965-966 PAPER NO. 268 SKID TRAILS	1976 IDDING IN NORTHERN MISSISSIPPI NAL 40(6):965-966 SKID TRAILS	,	,	,	,	,	,
DISSMEYER, GEORGE E. ECONOMIC IMPACTS OF EROSION CONTROL I SOUTHERN PORESTRY SYMPOSIUM, ATLANTA, PAPER NO. 293	1985 IN PORESTS , GA, NOV 19-21, 1985 MULTIPLE	×	×	×	×	,	B, C, IRR
DISSMEYER, GEORGE E. POSTER, BENNETT SOME ECONOMIC BENEFITS OF PROTECTING WA USFS SO-65 GENERAL TECHNICAL REPORT PAPER NO. 289	ETT 1987 WATER QUALITY (IN A PROCEEDINGS) MULTIPLE	S.	×		,		B,C,B/C,IRR
DOUGLASS, JAMES E. ET AL STORMFLOW CHANGES APTER PRESCRIBED BURNING & CLEARCUTTING PINE STANDS IN SC USPS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONP PROC:454 PAPER NO. 508	1982 URNING & CLEARCUTTING PINE STANDS IN SC N SILVICULTURAL RESEARCH CONP PROC:454-460 LOGGING SYSTEM	IDS IN SC PROC: 454-460		,		,	
DUZAN, HOWARD W., JR. ALLEN, H. LEE ESTIMATING PERTILIZER RESPONSE IN SIT USPS SO-34 GTR, 1ST BIENNIAL SOUTHERN PAPER NO. 68	E TE-PREP PINE PLANTAT USING B.A./SITE INDEX N SILVICULTURAL RESEARCH CONP PROC:219-222 PERTILIZATION	/SITE INDEX	,		,	×	,

NO	PRACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y TABLES	ECONOMICS
EDWARDS, M. BOYD, JR. 3-YR PERFORM PLANTED LOBLOLLY SEEDL ON USFS SE-337 RESEARCH NOTE PAPER NO. 57	1986  SEEDL ON LOW PIEDMONT SITE AFTER 6  SITE PREPARATION	SITE PREPS	×	·		,	
FEDKIW, JOHN CONVERSION OP SOUTHERN CROPLAND TO SOUTHERN PINE USDA OFFICE OP BUDGET AND PROGRAM ANALYSIS PAPER NO. 740	L AND TO SOUTHERN PINE TREE PLANTINGS: CONVERSION OGRAM ANALYSIS TYPE CONVERSION	CONVERSION					B,C,IRR
FISHER, R. F. SOILS INTERPRETATIONS FOR SILVICULTURE USPS SO-34 GTR, 1ST BIENNIAL SOUTHERN PAPER NO. 175	1980 ILVICULTURE IN THE SOUTHEASTERN COASTAL PLAIN SOUTHERN SILVICULTURAL RESEARCH CONF PROC:323-330	AL PLAIN IP PROC: 323-33	× 05	×	•		
FISHER, RICHARD P. A PRELIMINARY GUIDE TO MAINTAINING & A REPORT FOR USPS REGION 8 PAPER NO. 243	1981 TAINING & IMPROVING FOREST SITE PRODUCTIVITY IN SE MULTIPLE	UCTIVITY IN S	,	,	•	•	•
FISHER, RICHARD F. PREDICTING TREE AND STAND RESPONSE TO CULTY 6TH NORTH AMERICAN POREST SOILS CONF:53-65 PAPER NO. 32	1983 IESPONSE TO CULTURAL PRACTICES SOILS CONF:53-65 MULTIPLE		×	×		•	1

CITATION	PRACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y TABLES	ECONOMICS
FLICK, WARREN A.  LOBLOLLY PINE PLANTATIONS IN SOUTHERN HIGHLANDS:  SOUTHERN JOURNAL OF APPLIED FORESTRY (3):107-113  PAPER NO. 221	1979 IN HIGHLANDS: SOME PINANCIAL GUIDES (3):107-113	DES '	,	,			B, C, B/C, IR
FOX, T. R. ADAPTATION OF POREST NUTRIENT CYCLING USPS SO-54 GTR, 3RD BIENNIAL SOUTHERN PAPER NO. 24	1984 IG TREND EVALUATOR (FORCYTE)-LOBLOLLY PINE AN SILVICULTURAL RESEARCH CONP PROC:203-211 MULTIPLE	3LOLLY PINE PROC:203-211 X	×		×		
FOX, T. R.  EPFECTS OF SITE PREPARATION ON NITROGEN DYNAMICS IN THE SOUTHERN PIEDMONT FOREST ECOLOGY AND MGMT 15:241-256  PAPER NO. 33	1986 IGEN DYNAMICS IN THE SOUTHERN PI SITE PREPARATION	EDMONT	,		ŧ		
GAISER, RICHARD N.  RELATION BETWEEN SOIL CHAR & SITE INDEX OP LOBLOLLY IN COASTAL PLAIN REGION JOURNAL OP PORESTRY 48(4):271-275 PAPER NO. 63	1950 IDEX OP LOBLOLLY IN COASTAL PLAI	IN REGION			×		
GENT, J. A.  IMPACT OF HARVEST & SITE PREP ON PHYSICAL PROPERTIES OF SOIL SCIENCE SOCIETY OF AMERICAN JOURNAL 48:173-177  PAPER NO. 41	1984 SICAL PROPERTIES OF PIEDMONT FOREST SOILS IRNAL 48:173-177 MULTIPLE	DREST SOILS			,	,	,

CITATION	PRACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y	ECONOMICS
GENT, J. A., JR.  IMPACT OF INTENSE FOR MGT PRACT ON BU SOUTHERN JOURNAL OF APPLIED FORESTRY PAPER NO. 23	1985 ULK DENSITY COASTAL PLAIN/PIEDMONT SOILS 9(1):44-48 MULTIPLE	ONT SOILS	,		,		,
GLOVER, GLENN R. ET AL FAYETTE SITE PREPARATION STUDY22 YEAR RESULTS (JUNE 1981) AUBURN UNIV, DEPT OF PORESTRY, SILVIC HERBICIDE COOP NOTE # PAPER NO. 42	1981 EAR RESULTS (JUNE 1981) C HERBICIDE COOP NOTE #1 SITE PREPARATION			,	,	,	C, IRR
GOLDEN, MICHAEL S. ET AL PREDICTING SITE INDEX FOR OLD-FIELD I SOUTHERN JOURNAL OF APPLIED FORESTRY PAPER NO. 66	1981 LOBLOLLY PINE PLANTATIONS 5(3):109-114	,	,	•	×	4	
GRANO, CHARLES X. ERADICATING UNDERSTORY HARDWOODS BY IUSFS SO-56 RESEARCH PAPER PAPER NO. 29	1970 REPEATED PRESCRIBED BURNING COMPETITOR CONTROL		,	,	ı	,	
GRANO, CHARLES X. SMALL HARDWOODS REDUCE GROWTH OF PINE USFS SO-55 RESEARCH PAPER PAPER NO. 30	1970 E OVERSTORY COMPETITOR CONTHOL	,	,		,	,	

CITATION	PRACTICE	STOCKING	SEED SAP GROWTH	POLE & SAW	GROWTH	G AND Y	
GULDIN, RICHARD W. HANDPLANTING COSTS ARE INPLUENCED BY USFS SE-24 GTR, 2ND BIENNIAL SOUTHERN PAPER NO. 275	1982 ENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:30-33 MULTIPLE	, voc:30-33	×				C C C
HAFLEY, W. L. A NEW YIELD PREDICTION TECHNICAL REPORT NO. 1, PAPER NO. 755	A NEW YIELD PREDICTION MODEL POR UNTHINNED LOBLOLLY PINE IN PLANTATIONS TECHNICAL REPORT NO. 1, SOUTHERN POREST RESEARCH CENTER, N.C. STATE UNIVERSITY PAPER NO. 755	ONS UNIVERSITY	,	•	,	×	
HALLS, LOWELL K.  TREE-HERBAGE RELATIONS IN PINE-HARDWOO JOURNAL OF FORESTRY 63(4):282-283 PAPER NO. 365	SCHUSTER, JOSEPH L. 1965 IN PINE-HARDWOOD FORESTS OP TEXAS 4):282-283			×		,	,
HARMS, WILLIAM R. A COMPETITION FUNCTION FOR TREE USFS SO-34 GTR 1ST BIENNIAL COM	A COMPETITION FUNCTION FOR TREE AND STAND GROWTH MODELS USES SO 74 GTR 16T PIECEMANA.						

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USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:179-183

PAPER NO. 65

PREDICTING LOBLOLLY PINE CURRENT GROWTH & GROWTH RESPONSE TO FERTILIZATION

ET AL

HART, S. C.

SOIL SCIENCE SOCIETY OF AMERICA JOURNAL 50(1):230-233

PAPER NO. 35

FERTILIZATION

NOTE	PRACTICE	STOCKING	SEED SAP	POLE 6. SAW	GROWTH	G AND Y TABLES	ECONOMICS
G. E. ET AL TURBANCES IN LOGGING, EFFECTS OF PORESTRY 68(12):772-775	ON SOIL CHARACTER & GROWTH OF LOBLOLLY LOGGING SYSTEM	X	×	ı	,		
HATCHELL, GLYNDON E. SITE PREP & PERTILIZER INCREASE PINE GROV SOUTHERN JOURNAL OP APPLIED PORESTRY 5(2)	1981 GROWTH ON SOILS COMPACTED IN LOGGING 5(2):79-83 MULTIPLE		×	,	ı	,	•
HAYWOOD, J. D.  INTENSIVE SITE PREPARATION APPECTS LOBLOLLY PINE GROWTH ON UPLAND SITES AMER SOC AGR ENGINEERS SYMP ON ENGINEERING SYSTEM FOREST REGENERATION (MARCH) PAPER NO. 14	1981 DLLY PINE GROWTH ON UPLAND S ING SYSTEM FOREST REGENERATI	SITES ION (MARCH)	×	ı			•
HAYWOOD, J. D. HOW SITE TREATMENTS APPECT PINE AND COMPETING PLANT COVER SOUTHERN WEED SCIENCE SOCIETY PROC (JANUARY 1982):224-230 PAPER NO. 37	1982 COMPETING PLANT COVER JANUARY 1982):224-230 SITE PREPARATION	,	×		•	,	•
1980 CONTROL OF DOGPENNEL DOES NOT INCREASE LOBLOLLY PINE YIELDS USPS SO-258 RESEARCH NOTE PAPER NO. 9	1980 LOBLOLLY PINE YIELDS COMPETITOR CONTROL		×	•	·	•	ı

CITATION	PRACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y TABLES	ECONOMICS
HAYWOOD, JAMES D. PREPARING PINE PLANTING SITES WITH SOUTHERN WEED SCIENCE SOCIETY PROC PAPER NO. 12	1980 ES WITH PICLORAM PELLETS TY PROC 33:115-118 COMPETITOR CONTROL	,	×				
HU, SHIH-CHANG THE EFFECTS OF SITE PREPARATION ON USFS SO-34 GTR, 1ST BIENNIAL SOUTH PAPER NO. 18	, SHIH-CHANG  THE EFFECTS OF SITE PREPARATION ON GROWTH OF LOBLOLLY PINE IN SE LOUISIANA USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONP PROC:92-95 PAPER NO. 18	OUISIANA PROC:92-95	×			•	
HURST, GEORGE A. IMPACTS OF SILVIC PRACTICES IN LOBLOLIUSFS SE-24 GTR, 2ND BIENNIAL SOUTHERN PAPER NO. 347	RST, GEORGE A.  IMPACTS OF SILVIC PRACTICES IN LOBLOLLY PLANTATIONS ON WHITE-TAILED DEER HAB USFS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVICULTURE RESEARCH CONF PROC:484-487 PAPER NO. 347	D DEER HAB ROC:484-487		,			,
JORGENSEN, JACQUES WELLS, CAROL FORESTERS' PRIMER IN NUTRIENT CYCLING USFS SE-37 GENERAL TECHNICAL REPORT PAPER NO. 3	WELLS, CAROL RIENT CYCLING RICAL REPORT MULTIPLE				×	•	
JORGENSEN, JACQUES R. USE OF LEGUMES IN SOUTHEASTERN FORESTRY RESEARCH USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTU PAPER NO. 44	1980 ERN FORESTRY RESEARCH L SOUTHERN SILVICULTURAL RESEARCH CONF PROC:205-211 FERTILIZATION	PROC:205-211	,			•	

CITATION	PRACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y	ECONOMICS
KOPACK, ROB SURVIVAL & GROWTH OF LOBLOLLY & SH OUACHITA NATIONAL POREST, REGION 8 PAPER NO. 690	PACK, ROB  SURVIVAL & GROWTH OF LOBLOLLY & SHORTLEAP PINE SEEDLINGS ON CHOCTAW RANGER DIS OUACHITA NATIONAL POREST, REGION 8 PAPER NO. 690	RANGER DIS	×	,	,		
KREH, R. E. SOIL COMPACT PROM TRACKED/RUBBER-TIRE USFS SO-54 GTR, 3RD BIENNIAL SOUTHERN PAPER NO. 55	1984 D TRACTORS, INPLU SEEDLING SURV SILVICULTURAL RESEARCH CONP PR MULTIPLE	//GROWTH 10C:327-330	×				,
LANGDON, O. GORDON MCKEE, WILLIA CAN PERTILIZATION OP LOBLOLLY PINE ON USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN PAPER NO. 21	MCKEE, WILLIAM H., JR. 1980 BLOLLY PINE ON WET SITES REDUCE THE NEED FOR DRAINAGE INIAL SOUTHERN SILVICULTURAL RESEARCH CONP PROC:212-218 FERTILIZATION	DRAINAGE 10C:212-218	,	×	,	,	۵
LANTAGNE, D. O.  1ST YR SURVIVAL/GROWTH LOBLOLLY AS AP USFS SE-24 GTR, 2ND BIENNIAL SOUTHERN PAPER NO. 51	NTAGNE, D. O. BURGER, J. A. 15T YR SURVIVAL/GROWTH LOBLOLLY AS APPECTED BY SITE PREP ON SC & GA PIEDMONT USFS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:5-10 PAPER NO. 51	PIEDMONT 10C:5-10	×	•	,	,	ı
LOCKABY, B. GRAEME VIDRINE, CLYI EFFECT OP LOG EQUIP TRAFFIC ON SOIL I SOUTHERN JOURNAL OP APPLIED FORESTRY PAPER NO. 59	CKABY, B. GRAEME VIDRINE, CLYDE G. 1984 EFFECT OP LOG EQUIP TRAFFIC ON SOIL DENSITY, GROWTH/SURVIVAL OF YOUNG LOBLOLLY SOUTHERN JOURNAL OP APPLIED FORESTRY 8(?):109-112 PAPER NO. 59 LOGGING SYSTEM	י ופ דספרסרדג	×	,			

			STOCKING	SEED SAP	POLE	GROWTH	G AND Y	
CITATION	PRACTICE		LEVEL	GROWTH	& SAW	CURVES	TABLES	ECONOMICS
MCKEE, W. H., JR ET AL MANAGING SITE DAMAGE PROM LOGGING USFS SE-32 GENERAL TECHNICAL REPORT PAPER NO. 1	MULTIPLE	1985		*	1 1 1 1 1 1 1 1	×		
MCKEE, W. H., JR.  RESPONSE TO PERTILIZATION ON THE PRANCIS USFS REPORT FS-SE-1103-157(2) PAPER NO. 73	MARION & FERTILIZA	1985 SUMTER NATIONAL PORESTS TION	PORESTS -	,	×	ı	•	B,C,B/C,IRR
MCKEE, W. H., JR. RESPONSE TO PERTILIZATION ON THE PRANCIS USFS SOUTHEAST POREST EXPERIMENT STA AND PAPER NO. 691			NATIONAL FORESTS SUMTER NAT'L FOREST X	•	×	•		B, C, B/C, 1RR
MCKEE, WILLIAM H. CHANGES IN SOIL PERTILITY FOLLOWING PRESCRIBED BURNING COASTAL PLAIN PINE USFS SE-234 RESEARCH PAPER PAPER NO. 168	1982 ESCRIBED BURNING CO SITE PREPARATION	1982 IING COASTAL PLA IRATION	AIN PINE SITE		1	•		
MCLEMORE, B. F. MINIMUM STOCK LEVEL REQ POR SUCCESS MGT OP UNEVEN-AGED LOBLOLLY-SHORTLEAP PINE USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:292-293 PAPER NO. 45		1980 OP UNEVEN-AGED LOBLOLLY-SHORTLEAP PINE LVICULTURAL RESEARCH CONF PROC:292-293	HORTLEAP PINE PROC:292-293 X				,	,

		STOCKING	SEED SAP	POLE	GROWTH	G AND Y	
CITATION	PRACTICE	LEVEL	GROWTH	& SAW	CURVES	TABLES	ECONOMICS
MILLER, JAMES H. COMPETITION AFTER WINDROWING OR SINGLE-ROLLER SOUTHERN WEED SCIENCE SOCIETY PROC 33:139-145 PAPER NO. 7	1980 GLE-ROLLER CHOPPING SITE PREP IN 33:139-145 SITE PREPARATION	S PIEDMONT	,	,	,	,	,
MOEHRING, DAVID M.  DETRIMENTAL EPFECTS OP WET WEATHER LOGGING JOURNAL OP PORESTRY 68(3):166-167 PAPER NO. 15	M. LOGGING LOGGING SYSTEM	ı	,	×	ı		
MURPHY, PAUL A. GROWTH & YIELD OP UNEVEN-AGED LOBLOLLY-SHORTLEAP PINE STANDSPROGRESS REPORT USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONP PROC:305-31 PAPER NO. 70	1980 LLY-SHORTLEAP PINE STANDSPROGRESS REPORT RN SILVICULTURAL RESEARCH CONP PROC:305-310	RESS REPORT PROC:305-310	ı	ı	ı	×	ı
NC STATE FOREST FERT COOP - NORTH CAROLINA STATE FOREST PERTILIZATION COOPERATIVE SCHOOL OP POREST RESOURCES, N.C. STATE UNIV, RALEIGH PAPER NO. 757	ZATION COOPERATIVE THIRTEENTH ANNUAL REPORT ATE UNIV, RALEIGH FERTILIZATION	NNUAL REPORT	×	×	ı	,	ı
NC STATE FOREST FERT COOP - LOBLOLLY PINE PERTILIZER PLANNING PROGRAM: DESCRIPTION AND USER GUIDE NCSFFC RESEARCH NOTE NO. 3, SCHOOL OP FOREST RESOURCES, N.C. STATE UN PAPER NO. 756	1983 ROGRAM: DESCRIPTION AND USER GUIDE OP FOREST RESOURCES, N.C. STATE UNIVERSITY FERTILIZATION	UNIVERSITY	×	· ×	,		в, с

	PRACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y	ECONOMICS
NC STATE FOREST FERT COOP - 198 PHOSPHORUS PERTILIZATION IN YOUNG LOBLOLLY PINE STANDS NCSFFC REPORT NO. 17, SCHOOL OP FOREST RESOURCES, N.C. PAPER NO. 754	1984 BLOLLY PINE STANDS ST RESOURCES, N.C. STATE UNIVERSITY PERTILIZATION	RSITY	×	*	,		
NEARY, D. G. SITE PREPARATION AND NUTRIENT MANAGEMENT IN SOUTHERN PINE FORESTS 6TH NORTH AMERICAN FOREST SOILS CONP:121-144 PAPER NO. 13	1983 HENT IN SOUTHERN PINE FORESTS:121-144 MULTIPLE	•	×		,	,	
NELSON, LARRY R.  IMPACTS OF HERBACEOUS WEEDS IN YOUNG LOBLOLLY PINE PLANTATIONS SOUTHERN JOURNAL OF APPLIED FORESTRY:153-158 PAPER NO. 8  COMPETITOR CONTROL	UNKWN LOBLOLLY PINE PLANTATIONS :153-158 COMPETITOR CONTROL	,	×		,	,	,
PEARSON, HENRY A. FOREST AND RANGE INTERACTIONS USPS SO-34 GTR, 1ST BIENNIAL SOUTHERN PAPER NO. 360	1980 N SILVICULTURAL RESEARCH CONF PROC:339-342	PROC:339-342 X	×	ı	,	,	B, C. IRR
PEARSON, HENRY A.  POREST GRAZING IN THE SOUTHERN UNITED STATES OR ST UNIV, COLLEGE OF AGR SCI, SYMP SERIES PAPER NO. 358	1983 D STATES SERIES 2. TIMBER PRESS, BEAVERTON:247-260 VEGETATIVE MGMT	RTON:247-260	×	,	,	,	æ

CITATION	PRACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y	ECONOMICS
PEHL, C. E. BAILEY, R. L. PERFORM TO AGE 10 LOBLOLLY PINE PLANT FOREST SCIENCE 29(1):96-102 PAPER NO. 58	1983 ON INTENSE PREP SITE IN GEORGIA PIEDMONT SITE PREPARATION	ORGIA PIEDMONT	×	,	,	,	,
PEHL, CHARLES E. SITE PREPARATION INPLUENCES ON YOUNG L SOUTHERN JOURNAL OP APPLIED FORESTRY 8 PAPER NO. 36	1984 LOBLOLLY PINE PLANTATIONS IN EAST TEXAS 8(?):140-145 SITE PREPARATION	EAST TEXAS		ı	,		·
PRITCHETT, W. L. POREST PERTILIZATION IN THE U.S. SOUTHEAST 4TH NORTH AMERICAN POREST SOILS CONP PROC: PAPER NO. 27	1973 HEAST PROC: 467-476 FERTILIZATION	,	*	,	,	,	•
SARIGUMBA, TERRY I. FERTILIZATION OP YOUNG PLANTATIONS IN COPIES AVAILABLE UPON REQUEST PAPER NO. 169	UNKWN THE SOUTHEAST FERTILIZATION		×	×		•	,
SAUCIER, JOSEPH R.  GREEN WEIGHT, VOLUME, BOARD-FOOT AND C GEORGIA FORESTRY COMMISSION, GEORGIA P PAPER NO. 235	1981 CORD TABLES FOR MAJOR SOUTHERN PINES PORES1 RESEARCH PAPER 19	ERN PINES SPP		,	,	×	

CITATION	PRACTICE	STOCKING	SEED SAP GROWTH	POLE & SAW	GROWTH	G AND Y TABLES	ECONOMICS
SCHUMACHER, F. X. COILE, T. S. GROWTH AND YIELDS OF NATURAL STANDS OF THE BUBLISHED BY T. S. COILE, INC., DURHAM, N.C. PAPER NO. 283	1960 OF THE SOUTHERN PINES HAM, N.C.	×	,	,	,	×	
SHOULDERS, EUGENE DEALING WITH SITE DISTURBANCES FROM HARVESTING & SYMPOSIUM ON PRINCIPLES OF MAINT PRODUCTIVITY ON PAPER NO. 269 MULTIPLE	HARVESTING & SITE PREP IN LOW COAST PLAIN ODUCTIVITY ON PREP SITE PROC, MS STATE UNIV MULTIPLE	OAST PLAIN STATE UNIV					,
SIMMONS, GERRY L. EZELL, ANDREW W. ROOT DEVELOPMENT OF LOBLOLLY PINE SEEDLINGS IN COMPACTED SOILS USFS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVICULTURAL RESEARCH C PAPER NO. 53	1982 EEDLINGS IN COMPACTED SOILS RN SILVICULTURAL RESEARCH CONF PROC:26-29 SITE PREPARATION	ROC: 26-29	×			•	,
SMALLEY, GLENDON W. BAILEY, ROBER YIELD TABLES AND STAND STRUCTURE FOR USFS SO-96 RESEARCH PAPER PAPER NO. 71	ERT L. 1974 R LOBLOLLY PINE PLANTATIONS IN TN, AL,	N, AL, GA	×	,	×	×	
STAFFORD, C. W. ET AL AN EVALUATION OF SITE PREP METHODS FOR LOBLOLLY PINE REGENERATION USFS SO-54 GTR, 3RD BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONP PAPER NO. 50	1984 FOR LOBLOLLY PINE REGENERATION ON PIEDMONT RN SILVICULTURAL RESEARCH CONF PROC:57-60 SITE PREPARATION	ON PIEDMONT PROC:57-60	×			,	

PRACTICE	STOCKING	SEED SAP GROWTH	POLE & SAW	GROWTH	G AND Y TABLES	ECONOMICS
STEWART, RONALD (COMPILER ET AL  EFFECTS OF COMPETING VEGETATION ON FOREST TREES: A BIBLIOGRAPHY WITH ABSTRACTS USFS WO-43 GENERAL TECHNICAL REPORT  PAPER NO. 300	ITH ABSTRACTS X	×	×	×	×	в, С
1981 SITE PREPARATION EPFECTS ON SOIL BULK DENSITY AND PINE SEEDLING GROWTH SOUTHERN JOURNAL OP APPLIED PORESTRY 5(4):176-180 PAPER NO. 34		×	•	ı		
STRANSKY, J. J. SOIL PROPERTIES & PINE GROWTH AFPECTED BY SITE PREPARATION AFTER CLEARCUTTING SOIL PROPERTIES & PINE GROWTH AFPECTED BY SITE PREPARATION SOUTHERN JOURNAL OF APPLIED FORESTRY 9(1):40-44 PAPER NO. 48	CLEARCUTTING -	×	,	,	•	,
STRANSKY, JOHN J.  FORAGE AND PINE GROWTH WITH CLEARCUTTING AND SITE PREPARATION USPS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:343-348 PAPER NO. 353	IP PROC: 343-34	× &	×	ı	,	,
SULLIVAN, ALPRED D. WILLISTON, HAMLIN L. 1977 GROWTH & YIELD OF THINNED LOBLOLLY PINE PLANTATIONS IN LOESSIAL SOIL AREAS MISSISSIPPI AGRICULTURAL POREST EXPERIMENT STATION TECHNICAL BULLETIN (MAY)	SOIL AREAS LLETIN (MAY)			×	× ×	,

		STOCKING	SEED SAP		GROWTH	G AND Y	
	PRACTICE	LEVEL	GROWTH	& SAW	CURVES	TABLES	ECONOMICS
SWITZER, G. L.				1 1 1 1 1 1 1	1 1 1 1 1 1		
5TH NORTH AMERICAN FOREST SOILS CO	NF PROC: 477-51	PRAILON OLDERO					
PAPER NO. 287	MULTIPLE	ł	ì	ı	ı	ì	
TERRY, T. A.	ниднез, Ј. н. 1973						
ATH NORTH AMERICAN POREST	EFFECTS OF INTENSE MGT ON PLANTED LOBLOLLY PINE GROWTH ON POORLY DRAINED SOILS day north american popert soils cone process: 377	OORLY DRAINED SOILS					
PAPER NO. 28	MULTIPLE	ł	×	ŧ	×	ı	F
TEW, D. THOMPSON	ET AL 1986						
EST NUTRIENT REMOVAL, DISPLACE, LOSS FRO FOREST ECOLOGY AND MANAGEMENT 15:257-267	SPLACE, LOSS FROM HARVEST/SITE PREP OF LOBLOLLY IN NC EMENT 15:257-267	OF LOBLOLLY IN NC					
0.00		ı	,	,	,	,	ł
FAFER NO. 1/	ACLIANCE AND ACCES						
THILL, RONALD E. W	WOLTERS, GALE L. 1979						
PAPER NO. 359	VEGETATIVE MGMT	i	ì	t	ě	ı	В,С
TIARKS, ALLAN E. H	HAYWOOD, JAMES D. 1986						
PINUS TAEDA RESPONSE TO F	PINUS TAEDA RESPONSE TO FERTIL, HERBACEOUS PLANT CONTROL & WOODY PLANT CONTROL	WOODY PLANT CONTROL					
FOREST ECOLOGY AND MGMT 14(2):103-1	14(2):103-112						
PAPER NO. 22	MULTIPLE	à	×	ł	ı	ł	ì

CITATION	PRACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y	ECONOMICS
TIPPIN, TOM (EDITOR) PROCEEDINGS: SYMPOSIUM ON PRINCIPLES (USPS SE AREA STATE & PRIVATE PORESTRY PAPER NO. 234	1978 OF MAINT PRODUCTIVITY ON PREPARED SITES ', ATLANTA, GEORGIA MULTIPLE	RED SITES	ı	,	ì	×	O .
TORBERT, J. L.  EFFECT OVERBURDEN TYPE & ORGANIC AMEND ON GROWTH PINES ON RECLAIM SURFACE MINE USFS SO-54 GTR, 3RD BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:369-374 PAPER NO. 49	1984 ID ON GROWTH PINES ON RECLAIM SURFACE MINE SILVICULTURAL RESEARCH CONF PROC:369-374	:URFACE MINE ROC:369-374	×		ı		ı
TUTTLE, C. L. SITE PREP EPPECT ON SELECTED SOIL PROP USFS SO-54 GTR, 3RD BIENNIAL SOUTHERN S PAPER NO. 52	1984 & EARLY LOBLOLLY PINE SILVICULTURAL RESEARCH SITE PREPARATION	SEEDLING GROWTH CONF PROC: 45-52	×				
TUTTLE, CHARLES L. ET AL EPPECT OF SURPACE SOIL REMOVAL ON SELECTED SOIL PROP & LOBLOLLY PINE SEEDLINGS USPS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:18-22 PAPER NO. 54	1982 ECTED SOIL PROP & LOBLOLLY PINE SEEDLIN SILVICULTURAL RESEARCH CONF PROC:18-22 MULTIPLE	IE SEEDLINGS ROC:18-22	×		ı		ı
URSIC, S. J. HYDROLOGIC EFFECTS OF COMPLETE & CONVENTIONAL HARVEST OF LOBLOLLY PINE BIOMASS USFS SO-54 GTR, 3RD BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:565-572 PAPER NO. 467	1984 ENTIONAL HARVEST OF LOBLOLLY PINE BIOMASS SILVICULTURAL RESEARCH CONF PROC:565-572 LOGGING SYSTEM	INE BIOMASS ROC:565-572		×			,

CITATION	PRACTICE	STOCKING	SEED SAP GROWTH	POLE & SAW	GROWTH	G AND Y	
VITOUSEK, PETER M.  INTENSIVE HARVEST & SITE PREP DECREASE  SOUTHERN JOURNAL OF APPLIED PORESTRY 9( PAPER NO. 40	MATSON, PAMELA A. 1985 TE PREP DECREASE SOIL NITROGEN AVAIL IN YOUNG PLANTATION PLIED PORESTRY 9(2):120-125 MULTIPLE	NUNG PLANTATION	×		,		
WALKER, LAURENCE C. PERKINS, HENRY F FOREST SOILS AND SILVICULTURE IN GEORGIA SCHOOL OF FORESTRY & COLLEGE OF AGRIC, U PAPER NO. 233	LKER, LAURENCE C. PERKINS, HENRY F. 1958 FOREST SOILS AND SILVICULTURE IN GEORGIA SCHOOL OP FORESTRY & COLLEGE OP AGRIC, UNIV OF GEORGIA-ATHENS, REPORT 4 PAPER NO. 233	EPORT 4	,	ı	×		,
WEBB, ROGER S. SUBSOILING AND REDUCED SOUTHERN JOURNAL OF APP PAPER NO. 38	BB, ROGER S. SUBSOILING AND REDUCED RADIAL GROWTH-SEED ORCHARD LOBLOLLY ESTAB ON SANDY SOIL SOUTHERN JOURNAL OF APPLIED FORESTRY 6(?):163-167 PAPER NO. 38	ON SANDY SOIL	×		,	,	4
WELLS, C. G. NUTRIENT CYCLING IN LOBLOLLY PINE PLANTATIONS 4TH NORTH AMERICAN FOREST SOILS CONF PROC:137-	LLS, C. G. JORGENSEN, J. R. NUTRIENT CYCLING IN LOBLOLLY PINE PLANTATIONS 4TH NORTH AMERICAN POREST SOILS CONF PROC:137-158 PAPER NO. 67	,	,		,		,

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PAPER NO. 5

MAINTENANCE AND IMPROVEMENT OF SOIL PRODUCTIVITY

MORRIS, LARRY

WELLS, CAROL

1983

CITATION	PRACTICE	STOCKING	SEED SAP GROWTH	POLE & SAW	GROWTH	G AND Y TABLES	ECONOMICS
WELLS, CAROL WHEN AND WHERE TO APPLY PERTILIZER USFS SE-36 GENERAL TECHNICAL REPORT PAPER NO. 2	1985 FERTILIZATION	×	,	ı	,		В, С,
WELLS, CAROL G.  5-YR VOL INCREMENT PROM N PERTIL IN THINNED PLANTATIONS OP POLE-SIZE LOBLOLLY FOREST SCIENCE 22(1):85-90  PAPER NO. 6	1976 .NNED PLANTATIONS OP POLE-SIZE FERTILIZATION	. говьоься		×	,	,	
WHIPPLE, SHERMAN D. WHITE, EDWIN H.  RESPONSE OP PLANTED LOBLOLLY PINE FOLLOWING VARIOUS CONVERSION METHODS AUBURN UNIV, AGRIC EXPERIMENT STATION, BULLETIN 362 (NOV) PAPER NO. 43  COMPETITOR CONTROL	1965 WING VARIOUS CONVERSION METHC BULLETIN 362 (NOV) COMPETITOR CONTROL	s ×	×	,	×		v
WILLIAMS, THOMAS M.  WATER QUALITY CHANGES ASSOCIATED WITH FOUSPS SO-54 GTR, 3RD BIENNIAL SOUTHERN SIPAPER NO. 466	R. FOREST DRAINAGE & PINE PLANTATION ESTAB SILVICULTURAL RESEARCH CONP PROC:536-549 VEGETATIVE MGMT	10N ESTAB 10C:536-549		,			,
WILLISTON, HAMLIN L. RELEASE CUTTING IN SOUTHERN FORESTS: ECC USFS FOREST MGMT BULLETIN (NOV 1977)	1977 ECONOMICAL AND EPFECTIVE STAND CONVERSION COMPETITOR CONTROL	CONVERSION	×		,		

		STOCKING	STOCKING SEED SAP POLE	POLE	GROWTH	GROWTH G AND Y	
CITATION	PRACTICE	LEVEL	GROWTH	& SAW	CURVES	CURVES TABLES	ECONOMICS
WILLISTON, HAMLIN L.	1978						
GROWTH OF UNDERSTOCKED SOUTHERN PINE	PINE STANDS						
USFS FOREST MANAGEMENT BULLETIN, SE	SE AREA (FEBRUARY)						
PAPER NO. 11	COMPETITOR CONTROL	×	ı	,	ŧ	×	
WOOD, GENE W.	1986						
INFLUENCES OF POREST PERTILIZATION ON SOUTH CAROLINA DEER FORAGE QUALITY	ON ON SOUTH CAROLINA DEER FORAGE	: QUALITY					
SOUTHERN JOURNAL OF APPLIED FORESTRY	STRY 10:203-205						
PAPER NO. 345	PERTILIZATION	ł	ı	ı	,		ı

	PRACTICE	STOCKING	SEED SAP	POLE SAW	GROWTH	G AND Y	ECONOMICS
ALEXANDER, ROBERT R. SITE INDEXES LODGEPOLE PINE WITH CORRECTIONS FOR STAND DENSITY USPS RM-24 RESEARCH PAPER PAPER NO. 153	1966 CTIONS FOR STAND DENSITY	,			 	 	
ALEXANDER, ROBERT R. SILVIC SYSTEMS/CUTTING METHODS OP OLD- USPS RM-127 GENERAL TECHNICAL REPORT PAPER NO. 149	1986 -GROWTH LODGEPOLE PORESTS CTR ROCKY MTNS MULTIPLE	ROCKY MTNS	×	×	•		ŧ
ANDERSON, HENRY W.  PORESTS & WATER: EPPECT OF POREST MGMT USPS PSW-18 GENERAL TECHNICAL REPORT PAPER NO. 719	1986 ON PLOODS, SEDIMENTATION & GENERAL WATERSHED MGMT	WATER SUPPLY			•		
BRENDEMUEHL, R. H. OPTIONS FOR MANAGEMENT OF SANDHILL FOREST LAND SOUTHERN JOURNAL OF APPLIED FORESTRY 5(4):216-; PAPER NO. 254	1981 REST LAND 5(4):216-222			ı	•		
CARMEAN, WILLARD H. POREST SITE QUALITY EVALUATION IN THE ADVANCES IN AGRONOMY 27(1975):209-269 PAPER NO. 232	1975 UNITED STATES			ı			t

	PRACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y	ECONOMICS
CLAYTON, JAMES L. ET AL SOIL DISTURBANCE - PRODUCTIVITY RELATIONS IN USFS RECION 4	UNKWN ATIONS IN CENTRAL IDAHO CLEARCUTS	ARCUTS	; ; ; ; ; ; ; ;		; ; ; ; ; ;		
PAPER NO. 151	MULTIPLE	,	×		r	,	1
COCHRAN, P. H. RESPONSE OF POLE-SIZE LODGEPOLE PINE	1975 TO FERTILIZATION						
USFS PNW-247 RESEARCH NOTE PAPER NO. 154		,	×	×	ı	ı	1
DEBYLE, NORBERT V. HARVEST & SITE TREATMENT INPLUENCES ENVIRON CONSEQUENCE TIMBER HARVEST R PAPER NO. 147	1979 ON NUTRIENT STATUS LODGEPOLE PINE PORESTS ROCKY MTN CONIPEROUS POR SYMP PROC:137-155 MULTIPLE	NLE PINE PORESTS MP PROC:137-155	>4				
EIS, S. GROWTH LODGEPOLE PINE & WHITE SPRUCE IN CENTRAL INTERIOR OF BRITISH COLUMBIA CANADIAN JOURNAL OF POREST RESEARCH 12(1982):567-575  PAPER NO. 152	1982 S IN CENTRAL INTERIOR OF BR 12(1982):567-575	IITISH COLUMBIA X		,	×		,
FROEHLICH, H. A.  GROWTH OF YOUNG PINUS PONDEROSA & CONTORTA ON COMPACTED SOIL IN CENTRAL WA FOREST ECOLOGY AND MGMT 15(1986):285-294  PAPER NO. 89  '	1986 DNTORTA ON COMPACTED SOIL II 5-294 SKID TRAILS	N CENTRAL WA	×			,	,

CITATION	STOCKING PRACTICE LEVEL	CROWTH	POLE & SAW	GROWTH	G AND Y	ECONOMICS
GARY, HOWARD L. PATCH CLEARCUTS TO MANAGE SNOW IN LODGEPOLE PINE AM SOC CIVIL ENGINEERS, WATERSHED MANAGEMENT SYM PAPER NO. 494	RY, HOWARD L.  PATCH CLEARCUTS TO MANAGE SNOW IN LODGEPOLE PINE  AM SOC CIVIL ENGINEERS, WATERSHED MANAGEMENT SYMPOSIUM PROC 1:335-346  PAPER NO. 494	,	,	,	,	,
HOLMES, JOHN R. B. TACKLE, DAVID HEIGHT GROWTH OF LODGEPOLE PINE IN MONTANA RELATED TO MONTANA POREST & CONSERV EXP STA, SCHOOL OF FORESTRY, PAPER NO. 155	TACKLE, DAVID  LE PINE IN MONTANA RELATED TO SOIL AND STAND PACTORS  EXP STA, SCHOOL OP PORESTRY, BULLETIN 21 (MAY 1962)  X	S. G.				
KAUFMANN, MERRILL R. CANOPY MODEL (RM-CWU)-DETERM TRANSPIR CANADIAN JOURNAL OF POREST RESEARCH 1 PAPER NO. 492	1983 RANSPIR SUBALPINE POREST II. CONSUMP WATER USE EARCH 14:227-232 LOGGING SYSTEM	, 29	,	,	,	
KAUPMANN, MERRILL R. CANOPY MODEL (RM-CWU) FOR DETERM TRAN CANADIAN JOURNAL OF FOREST RESEARCH 1 PAPER NO. 491	1984 EARCH 14:218-226 LOGGING SYSTEM	, 13A:	,			
KAUPMANN, MERRILL R. MODELLING TRANSPIRATION OF SUBALPINE SYMP BY COMM ON WATERSHED MGMT/IRRIG PAPER NO. 489	1985 ALPINE TREES IN THE CENTRAL ROCKY MOUNTAINS /IRRIG & DRAIN, AM SOC CIVIL ENGINEERS 1:61-68 LOGGING SYSTEM	,			1	,

CITATION	PRACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y	ECONOMICS
KAUFMANN, MERRILL R.  NEW SILVICULTURAL OPTIONS POR TIMBER AND WATER YIELD IN THE RO SOCIETY OF AMERICAN FORESTERS NATIONAL CONVENTION PROC:237-242 PAPER NO. 490	1985 AND WATER YIELD IN THE ROCKY MOUNTAINS AL CONVENTION PROC:237-242 LOGGING SYSTEM	OUNTAINS		,	,	·	
LEAF, CHARLES P. WATERSHED MGMT IN CENTRAL & SOUTHERN R. USFS RM-142 RESEARCH PAPER PAPER NO. 723	1975 ROCKY MTNS: SUMMARY OF STATUS OF KNOWLEDG GENERAL WATERSHED MGMT	OF KNOWLEDG					
MCKAY, NEIL A STOCKABILITY EQUATION POR POREST LAND IN USPS PNW-435 RESEARCH NOTE PAPER NO. 274	1985 ID IN SISKIYOU COUNTY, CALIFORNIA -	V X		ı			
MCLEAN, ALASTAIR PRODUCING PORAGE POR LIVESTOCK ON FOREST RANGES OR ST UNIV, COLLEGE OP AGR SCI, SYMP SERIES 2. PAPER NO. 382	1983 SERIES 2. TIMBER PRESS, BEAVERTON:175-183 VEGETATIVE MGMT	TON: 175-183 X	×				
MOGREN, E. W. PREDICTION OF SITE INDEX OF LODGEPOLE POREST SCIENCE 18(4):314-316 PAPER NO. 156	1972 PINE FROM SELECTED ENVIRONMENTAL PACTORS	ITAL PACTORS			,	,	,

CITATION	PRACTICE	STOCKING	SEED SAP GROWTH	POLE L SAW	GROWTH	G AND Y	ECONOMICS
MURRAY, MAYO (ED)  LODGEPOLE PINE: REGENERATION AND MANAGEMENT USPS PNW-157 GENERAL TECHNICAL REPORT PAPER NO. 150	1983 MENT MULTIPLE	×	,	,	×	,	
PACKER, PAUL E.  LOGGING RESIDUE DISPOSAL EPPECTS ON SURPACE HYDRO/SOIL STABILITY OF LODGEPOLE ENVIRON CONSEQUENCE TIMBER HARVEST ROCKY MTN CONIPEROUS POR SYMP PROC:111-122 PAPER NO. 148	N D. 1979 IRPACE HYDRO/SOIL STABILITY OF KY MTN CONIPEROUS FOR SYMP PRO LOGGING SYSTEM	LODGEPOLE C:111-122				ı	
SCHMIDT, WYMAN C. LOTAN, JAMES E.  ESTABLISHMENT & INITIAL DEVELOPMENT OF LODGEPOLE PINE RESPONSE TO RESIDUE MGM ENVIRON CONSEQUENCE TIMBER HARVEST ROCKY MTN CONIPEROUS POR SYMP PROC:271-286 PAPER NO. 146	1979 LODGEPOLE PINE RESPONSE TO RESIDUE MGMT KY MTN CONIPEROUS POR SYMP PROC:271-286 MULTIPLE	SIDUE MGMT C:271-286 X	×		•	,	
SMITH, R. B.  TREE GROWTH ON SKIDROADS ON STEEP SLOPES LOGGED AFTER WILDPIRES-BRIT.COLUMBIA CANADIAN FORESTRY SERVICE, PACIFIC FOREST RESEARCH CENTRE (NOV. 1980) PAPER NO. 116  SKID TRAILS	1980 S LOGGED APTER WILDPIRES-BRIT ST RESEARCH CENTRE (NOV. 1980 SKID TRAILS	. COLUMBIA		,		,	
STEWART, RONALD (COMPILER ET AL EFFECTS OF COMPETING VEGETATION ON FOREST TREES: USPS WO-43 GENERAL TECHNICAL REPORT PAPER NO. 300	1984 ST TREES: A BIBLIOGRAPHY WITH ABSTRACTS COMPETITOR CONTROL X	ABSTRACTS	×	×	×	×	ິດ

		STOCKING	SEED SAP	POLE	GROWTH	GROWTH G AND Y	
CITATION	PRACTICE	TEVEL	GROWTH	WAS 3	CURVES	TABLES	ECONOMICS
TAPPEINER II, J. C. ET AL PART 2, PACIFIC COAST, THE NEXT 30 Y JOURNAL OF PORESTRY 84(5):37-46	ET AL HE NEXT 30 YEARS - SILVICULTURE - THE PAST 30 YEARS ):37-46	PAST 30 YEARS					
PAPER NO. 248	MULTIPLE	ł			1	,	•
TROENDLE, C. A.	MEIMAN, J. R. 1984						
OPTIONS FOR HARVESTING T	OPTIONS POR HARVESTING TIMBER TO CONTROL SNOWPACK ACCUMULATION	Z					
52ND ANNUAL MEETING, WES	52ND ANNUAL MEETING, WESTERN SNOW CONP PROC 1:86-97						
PAPER NO. 493	LOGGING SYSTEM	,	ı	i	,	,	

CITATION	PRACTICE		STOCKING LEVEL	SEED SAP	POLE & SAW	GROWTH	G AND Y	
ANDERSON, HENRY W. ET AL FORESTS & WATER: EPPECT OP POREST MGMT ON FLOODS, USFS PSW-18 GENERAL TECHNICAL REPORT PAPER NO. 719 GENERAL I	ON FLOODS,	1986   FLOODS, SEDIMENTATION & WATER SUPPLY GENERAL WATERSHED MGMT	WATER SUPPLY	,	,			20 T T T T T T T T T T T T T T T T T T T
BALMER, WILLIAM E.  EARLY CONSIDERATIONS IN PINE MANAGEMENT USPS POREST MANAGEMENT BULLETIN, SE AREA (OCTOBER) PAPER NO. 10  MULTIPLE	IN L. A (OCTOBER) MULTIPLE	1975		×	,	,		
BOYER, WILLIAM D. SITE/STAND PACTORS APPECTING HEIGHT GROWTH CURVES OF LONGLEAP PINE PLANTATIONS USPS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONP PROC:184-187 PAPER NO. 107	TH CURVES . LVICULTURA	1980 IOWTH CURVES OF LONGLEAP PINE PLANTATIONS SILVICULTURAL RESEARCH CONP PROC:184-187	PLANTATIONS TOC:184-187			×	,	,
BOYER, WILLIAM D. INTERIM SITE-INDEX CURVES FOR LONGLEAF PIUSFS SO-261 RESEARCH NOTE PAPER NO. 108	1980 PINE PLANTATIONS	1980 11 ONS	,			×	,	,
BOYER, WILLIAM D. GROWTH YG LONGLEAP OVER 7 YRS AS APPECT BY BIENN BURN SUPPL BY CHEM/ME USFS SE-24 GTR, 2ND BIENNIAL SOUTHENN SILVICULTURAL RESEARCH CONP PHOC PAPER NO. 105	1982 Y BIENN BURN SUP VICULTURAL RESEA SITE PREPARATION	1982 BY BIENN BURN SUPPL BY CHEM/MECH TREAT LVICULTURAL RESEARCH CONP PHOC SITE PREPARATION	CH TREAT	×		,		

CITATION	PRACTICE	STOCKING	SEED SAP	POLE & SAW	CURVES	TABLES	ECONOMICS
BRENDEMUEHL, R. H. OPTIONS FOR MANAGEMENT OF SANDHILL FOREST LAND SOUTHERN JOURNAL OF APPLIED PORESTRY 5(4):216-222 PAPER NO. 254	1981 DHILL FOREST LAND DRESTRY 5(4):216-222				•	•	
CARMEAN, WILLARD H. POREST SITE QUALITY EVALUATION IN ADVANCES IN AGRONOMY 27(1975):209- PAPER NO. 232	1975 N IN THE UNITED STATES :209-269	,				,	
FARRAR, ROBERT M., JR. A SITE-INDEX PUNCTION FOR NATURALLY REGENERATED LOSOUTHERN JOURNAL OF APPLIED FORESTRY 5(3):150-153 PAPER NO. 109	1981 A SITE-INDEX PUNCTION FOR NATURALLY REGENERATED LONGLEAF PINE EAST GULF AREA SOUTHERN JOURNAL OF APPLIED FORESTRY 5(3):150-153	AST GULP AREA	•		×		
PARRAR, ROBERT M., JR. WHIT: EARLY DEVELOPMENT OF LONGLEA! USFS SE-24 GTR, 2ND BIENNIAL PAPER NO. 106	RRAR, ROBERT M., JR. WHITE, JOHN B.  EARLY DEVELOPMENT OF LONGLEAP PINE PLANTED ON PREPARED SITES IN THE EAST GULP USFS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:109-117 PAPER NO. 106	THE EAST GUL	71 X				

USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONP PROC:323-330 SOILS INTERPRETATIONS POR SILVICULTURE IN THE SOUTHEASTERN COASTAL PLAIN

MULTIPLE

PAPER NO. 175

PISHER, R. P.

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP	POLE & SAW	GROWTH	G AND Y	ECONOMICS
PISHER, RICHARD P. A PRELIMINARY GUIDE TO MAINTAINING & IMP A REPORT POR USPS RECION 8 PAPER NO. 243	INPROVING POREST SITE PRODUCTIVITY IN SE	VITY IN SE			,		
E. AVORS SURVIVAL & EARLY NAL OP APPLIED FORESTR)	MULITYLE  1983  HEIGHT GROWTH OF LONGLEAF PINE SEEDLINGS  7(1):16-20	SEEDLINGS					
103	SITE PREPARATION	ı	×	ŧ.	ŧ	1	1
GRAZING CAPACITY OF WIREGRASSPINE RANG GEORGIA AGRIC EXP STA, UNIV OF GEORGIA C PAPER NO. 413	RANGES OP GEORGIA SIA COL OP AGRIC, TECHNICAL BULLETIN -	ETIN N.S. 2				1	œ
LEWIS, CLIFFORD E.  CHOPPING AND WEBBING CONTROL SAW-PALMETTO IN SOUTH PLORIDA USPS SE-177 RESEARCH NOTE	1972 O IN SOUTH PLORIDA						
PAPER NO. 328	RANGE REHABILITATION	ł	ŧ	ŧ	ŧ	ł	ı
LUNDGREN, GWYNNE K. ET AL  AN ECONOMIC ANALYSIS OF POREST GRAZING ON FOUR TIMBER MANAGEMENT SITUATIONS SOUTHERN JOURNAL OF APPLIED PORESTRY 7(3):119-124 PAPER NO. 352  VEGETATIVE MGMT  X	1983 IG ON FOUR TIMBER MANAGEMENT SI1 7(3):119-124 VEGETATIVE MGMT	TUATIONS		×	1	ŧ	B, C, 1RR

CITATION	PRACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y	ECONOMICS
MCKEE, WILLIAM H. CHANGES IN SOIL PERTILITY POLLOWING PRE USFS SE-234 RESEARCH PAPER PAPER NO. 168	1982  WING PRESCRIBED BURNING COASTAL PLAIN PINE  SITE PREPARATION	PLAIN PINE SITE		,			
MCKEE, WILLIAM H., JR. LEWIS, CLIPFORD INFLU OP BURN/GRAZ ON SOIL NUTRIENT PROUSFS SE-24 GTR, 2ND BIENNIAL SOUTHERN S	LEWIS, CLIFFORD E.  JIL NUTRIENT PROP & TREE GROWTH-COAST PLAIN AFTER 40 YR NNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:79-86 SITE PREPARATION	AIN AFTER 40 YR			•		
MCLEOD, KENNETH W.  RESPONSE OF LONGLEAP PINE PLANTATIONS T  POREST ECOLOGY AND MANAGEMENT 2(1979):I  PAPER NO. 110	1979 ATIONS TO LITTER REMOVAL P(1979):1-12	•			•		
MICHAEL, J. L. LONG-TERM IMPACT OP AERIAL APPLICATION WEED SCIENCE 28(3):255-257 PAPER NO. 101	1980 LICATION OP 2,4,5-T TO LONGLEAP PINE COMPETITOR CONTROL	, INE	×	×			
MOORE, WILLIAM H.  VEGETATIVE RESPONSE TO CLEARCUTTING & CHOPPING IN JOURNAL OF RANGE MANAGEMENT 35(2):214-218 PAPER NO. 326 RANGE HEI	_ A H	.982 N FLORIDA PLATWOODS FOREST				ı	,

CITATION	PRACTICE	LEVEL	GROWTH	AVS 1	CURVES	TABLES	ECONOMICS
MORRIS, LAWRENCE A. ET AL  DISPLACEMT OF NUTRIENT INTO WINDROWS DURING SITE PREPARATION OF PLATWD POREST  SOIL SCIENCE SOCIETY OF AMERICA JOURNAL 47(1983):591-594  PAPER NO. 165	1983 URING SITE PREPARATION OP L 47(1983):591-594 SITE PREPARATION	PLATWD POREST	,		,		
PEARSON, HENRY A. POREST AND RANGE INTERACTIONS USPS SO-34 GTR, 1ST BIENNIAL SOUTHERN S PAPER NO. 360	1980 SILVICULTURAL RESEARCH CONF PROC:339-342 -	NF PROC: 339-342	×			,	B, C, IRR
PEARSON, HENRY A. POREST GRAZING IN THE SOUTHERN UNITED STATES OR ST UNIV, COLLEGE OF AGR SCI, SYMP SERIES 2. PAPER NO. 358	1983 States Eries 2. Timber Press, Beaverton:247-260 Vegetative mgmt	AVERTON:247-260	×	r	· .	•	æ
SAUCIER, JOSEPH R. ET AL GREEN WEIGHT, VOLUME, BOARD-POOT AND CORD TABLES FOR MAJOR SOUTHERN PINES GEORGIA PORESTRY COMMISSION, GEORGIA POREST RESEARCH PAPER 19 PAPER NO. 235	1981 RD TABLES POR MAJOR SOUT REST RESEARCH PAPER 19	HERN PINES SPP				×	
SCHUMACHER, P. X.  GROWTH AND YIELDS OF NATURAL STANDS OF 'PUBLISHED BY T. S. COILE, INC., DURHAM,	1960 THE SOUTHERN PINES N.C.	>	,		,	>	

CITATION	PRACTICE	STOCKING	SEED SAP	POLE SAW	GROWTH	G AND Y TABLES	ECONOMICS
STEWART, RONALD (COMPILER ET AL  EFFECTS OF COMPETING VEGETATION ON FOREST TREES: A BIBLIOGRAPHY WITH ABSTRACTS USFS WO-43 GENERAL TECHNICAL REPORT  PAPER NO. 300  X	1984 OREST TREES: A BIBLIOGRAPHY COMPETITOR CONTROL	WITH ABSTRACTS	*	×	*	×	oʻ a'
THILL, RONALD E. WOLTERS, GALE L. CATTLE PRODUCTION ON A SOUTHERN PINE-HARDWOOD FOREST RANGELANDS 1(2):60-61 PAPER NO. 359	E L. 1979:-HARDWOOD POREST VEGETATIVE MGMT						o. 81
TIPPIN, TOM (EDITOR) PROCEEDINGS: SYMPOSIUM ON PRINCIPLES USPS SE AREA STATE & PRIVATE FORESTRY PAPER NO. 234	1978 OP MAINT PRODUCTIVITY ON PREPARED SITES Y, ATLANTA, GEORGIA MULTIPLE	REPARED SITES			•	×	<b>.</b> c
WALKER, LAURENCE C. PERKINS, HENRY F POREST SOILS AND SILVICULTURE IN GEORGIA SCHOOL OF PORESTRY & COLLEGE OF AGRIC, U PAPER NO. 233	RY F. RGIA C, UNIV OF GEORGIA-ATHENS, REPORT 4 MULTIPLE	EPORT 4	,		×		
WILLISTON, HAMLIN L. RELEASE CUTTING IN SOUTHERN FORESTS: USPS POREST MGMT BULLETIN (NOV 1977) PAPER NO. 104	1977 ECONOMICAL AND EPPECTIVE STAND CONVERSION COMPETITOR CONTROL	AND CONVERSION	×				,

CITATION	PRACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y	ECONOMICS
WILLISTON, HAMLIN L. GROWTH OF UNDERSTOCKED SOUTHERN PINE STANDS USPS POREST MANAGEMENT BULLETIN, SE AREA (FEBRUARY) PAPER NO. 11	1978 INE STANDS SE AREA (FEBRUARY) COMPETITOR CONTROL	×	,		,	×	,
WOLTERS, GALE L. SOUTHERN PINE OVERSTORIES INPLUENCE HERBAGE QUALITY JOURNAL OP RANGE MANAGEMENT 26(6):423-426 PAPER NO. 364	1973 CE HERBAGE QUALITY :423-426 VEGETATIVE MGMT	•	,	×		1	,
WOOD, GENE W. INPLUENCES OF POREST PERTILIZATION ON SOUTHERN JOURNAL OF APPLIED FORESTRY 1 PAPER NO. 345	1986 N ON SOUTH CAROLINA DEER FORAGE QUALITY TRY 10:203-205 PERTILIZATION	: QUALITY	ı	•		,	•



### TIMBER MODEL - CITATIONS POR MAPLES

	PRACTICE	STOCKING	SEED SAP GROWTH	POLE SAW	GROWTH	G AND Y	ECONOMICS
ANDERSON, HENRY W.  PORESTS & WATER: EPPECT OF POREST MGMT GUSFS PSW-18 GENERAL TECHNICAL REPORT PAPER NO. 719	1986 ON PLOODS, SEDIMENTATION & WATER SUPPLY GENERAL WATERSHED MGMT	WATER SUPPLY	,	, .	,	,	
BECK, DONALD E.  EVALUATING A DIAMETER-LIMIT CUT IN S. AF USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SI PAPER NO. 255	1980 APPALACHIAN HARDWOODS THROUGH STEM ANAL SILVICULTURAL RESEARCH CONP PROC:164-168 LOGGING SYSTEM	1 STEM ANAL PROC: 164-168		,	×		
BROADPOOT, W. M. SHALLOW-WATER IMPOUNDMENT INCREASES SOIL MOISTURE AND GROWTH OF HARDWOODS SOIL SCIENCE SOCIETY OF AMERICA PROC (JULY-AUGUST 1967):562-564 PAPER NO. 195	1967 OIL MOISTURE AND GROWTH OF HAR (JULY-AUGUST 1967):562-564 WATER RETENTION	S G O O M G r	,	×		,	
BUCHWAN, ROLAND G. SURVIVAL PREDICTIONS POR MAJOR LAKE STAT USPS NC-233 RESEARCH PAPER PAPER NO. 212	1983 ATES TREE SPECIES	×	×	•			
CARMEAN, WILLARD H. POREST SITE QUALITY EVALUATION IN THE UNADVANCES IN AGRONOMY 27(1975):209-269 PAPER NO. 232	1975 United States			•		,	

### TIMBER MODEL - CITATIONS FOR MAPLES

CITATION	PRACTICE	STOCKING	SEED SAP	POLE SAW	GROWTH	G AND Y	ECONOMICS
COVINGTON, W. WALLACE CHANGES IN POREST PLOOR ORGANIC MATTER	& NUTRIENT	1981 CONTENT FOLLOWING CLEAR CUT					
ECOLOGY 62(1):41-48 PAPER NO. 264	LOGGING SYSTEM	,	,		,	,	,
CROW, T. R. WEIGHT AND VOLUME EQUATIONS AND TABLES USPS NC-242 RESEARCH PAPER PAPER NO. 185	1984 FOR RED MAPLE IN THE LAKE STATES	KE STATES				×	
CROW, THOMAS R.  STOCKING & STRUCTURE POR MAXIMUM GROWTH IN SUGAR MAPLE SELECTION STANDS USPS NC-199 RESEARCH PAPER PAPER NO. 186	1981 H IN SUGAR MAPLE SELECTIC	ON STANDS	×			×	
LAMSON, NEIL I. EFFECT OF FERTILIZATION ON FOUR SPECIE: USPS NE FOREST EXPERIMENT STATION PAPER NO. 192	UNKWN ES IN MATURE APPALACHIAN H FERTILIZATION	UNKWN APPALACHIAN HARDWOOD STANDS TION X			•		,
LEEFERS, LARRY A. ET AL ECOLOGICAL CLASSIPICATION SYSTEM: INFORMATION AND ECONOMICS TO BE PRESENTED AT CENTRAL HARDWOODS FOREST CONFERENCE, KNO PAPER NO. 202	1987 ORMATION AND ECONOMICS FOREST CONFERENCE, KNOXVILLE, TN (PEB/87 MULTIPLE	.LE, TN (PEB/87)		×	•		

### TIMBER MODEL - CITATIONS FOR MAPLES

CITATION	PHACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y	ECONOMICS
OTTAWA NATIONAL FOREST POREST REPORT USFS REGION 9 PAPER NO. 681	1987 FOREST REPORT	,	,	,	,	,	B,C,B/C
SEDELL, JAMES R. IMPORTANCE OP STREAMSIDE PORE COPIES AVAILABLE UPON REQUEST PAPER NO. 606	DELL, JAMES R. PROGGATT, JUDITH L. 1984 IMPORTANCE OP STREAMSIDE PORESTS TO LARGE RIVERS: INSOLATION WILLAMETTE RVR COPIES AVAILABLE UPON REQUEST PAPER NO. 606	METTE RVR	,				
STEWART, RONALD (COMPILER ET AL EFPECTS OP COMPETING VEGETATION ON POREST TREES: USPS WO-43 GENERAL TECHNICAL REPORT PAPER NO. 300	L ION ON POREST TREES: A BIBLIOGRAPHY WITH ABSTRACTS REPORT COMPETITOR CONTROL X	TH ABSTRACTS X	×	×	×	×	ິຜ
TUBBS, CARL H. NORTHERN HARDWOODS IN THE NORTH CENTRAL USPS NC-39 GENERAL TECHNICAL REPORT PAPER NO. 182	1977 RTH CENTRAL STATES REPORT MULTIPLE	×	×	×			,
VON ALTHEN, P. W. EIGHT-YEAR RESULTS OP AN APPORESTATION STUDY THE FORESTRY CHRONICLE (DEC 1972):325-326 PAPER NO. 183	1972 ORESTATION STUDY 1972):325-326 MULTIPLE	,	×				

### TIMBER MODEL - CITATIONS FOR MAPLES

		STOCKING	SEED SAP POLE	POLE	GROWTH	GROWTH G AND Y	
CITATION	PRACTICE	LEVEL	GROWTH	& SAW	CURVES	CURVES TABLES	ECONOMICS
VON ALTHEN, P. W.	1981			 			
SITE PREP & POST-PLANTING WEED CONTROL IN HARDWOOD AFFORESTATION: WHITE ASH	N HARDWOOD AFFORESTATION: W	WHITE ASH					
CANADIAN FORESTRY SERVICE REPORT 0-x-325 (PEB 1981)	(PEB 1981)						
PAPER NO. 184	MULTIPLE	•	×		1		1
WILDE, S. A.	1933						
THE RELATION OF SOILS AND POREST VEGETATION OF THE LAKE STATES REGION	ION OF THE LAKE STATES REGI	ION					
ECOLOGY XIV(2):94-105							
PAPER NO. 288		•			,	1	,

### TIMBER MODEL - CITATIONS POR OAKS

CITATION	PRACTICE	STOCKING	SEED SAP GROWTH	POLE SAW	GROWTH	G AND Y TABLES	ECONOMICS
HENRY W. ET AL & WATER: EPPECT OP POREST -18 GENERAL TECHNICAL REPO 7. 719	I986 MGMT ON FLOODS, SEDIMENTATION & WATER SUPPLY SRT GENERAL WATERSHED MGMT	WATER SUPPLY					
BAILEY, TOM BARE SOIL AND PMC 180 LOGGING VEHICLE ON USFS JEPPERSON NATIONAL POREST PAPER NO. 675	1984 ON STEEP SLOPES IN VIRCINIA POREST REPORT		,			•	
BEASLEY, R. SCOTT GRANILLO, ALPREDO B. 1982 SEDIMENT LOSSES PROM POREST PRACTICES IN THE GULP COASTAL PLAIN OP ARKANSAS USPS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONP PROC:461-467 PAPER NO. 465	ALPREDO B. 1982 CES IN THE GULP COASTAL PLAIN OI IERN SILVICULTURAL RESEARCH CONP LOGGING SYSTEM	P ARKANSAS PROC: 461-46		•	•		
BECK, DONALD E. EVALUATING A DIAMETER-LIMIT CUT IN S. USPS SO-34 GTR, 1ST BIENNIAL SOUTHERN PAPER NO. 255	1980 APPALACHIAN HARDWOODS THROUGH STEM ANAL SILVICULTURAL RESEARCH CONP PROC:164-168 LOGGING SYSTEM	JGH STEM ANA	, , , ,		×	•	
BROADFOOT, W. M. SHALLOW-WATER IMPOUNDMENT INCREASES SOIL MOISTURE SOIL SCIENCE SOCIETY OP AMERICA PROC (JULY-AUGUST PAPER NO. 195	1967 SES SOIL MOISTURE AND GROWTH OF HARDWOODS PROC (JULY-AUGUST 1967):562-564 WATER RETENTION	HARDWOODS	•	×			

### TIMBER MODEL - CITATIONS POR OAKS

CITATION	PRACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y	ECONOMICS
CARMEAN, WILLARD H. FOREST SITE QUALITY EVALUATION IN THE ADVANCES IN AGRONOMY 27(1975):209-269 PAPER NO. 232	1975 E UNITED STATES	,	,				,
DALE, MARTIN E. GROWTH AND YIELD PREDICTIONS POR UPLAND OAK STANDS USPS NE-241 RESEARCH PAPER PAPER NO. 201		1972 - 10 YR AFTER INITIAL THIN			,	×	,
DANIELOVICH, STEVEN J. HIGH INTENSITY SITE PREP BURNING APTER CLEARCUTTING IN MASTERS THESIS - GRADUATE SCHOOL OF CLEMSON UNIVERSITY PAPER NO. 238	1986 R CLEARCUTTING IN S. LEMSON UNIVERSITY SITE PREPARATION	HARDWOODSEFFECTS	×	,		,	,
DISSMEYER, GEORGE E. ECONOMIC IMPACTS OF EROSION CONTROL IN PORESTS SOUTHERN PORESTRY SYMPOSIUM, ATLANTA, GA, NOV PAPER NO. 293 MULTI	1985 IN PORESTS GA, NOV 19-21, 1985 MULTIPLE	×	×	×	×	,	B, C, IRR
EINSPAHR, DEAN MCCOMB, A. L. SITE INDEX OP OAKS IN RELATION TO SOIL/TOPOGRAPHY IN NORTHEASTERN IOWA JOURNAL OP PORESTRY 49(10):719-723 PAPER NO. 199	1951 1L/TOPOGRAPHY IN NORTHEASTEI	RN IOWA					•

#### TIMBER MODEL - CITATIONS FOR OAKS

CITATION	PRACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y	ECONOMICS
GRANEY, D. L. PERTIL INCREASES GROWTH THINNED & N USFS SO-243 RESEARCH NOTE PAPER NO. 189	ANEY, D. L. POPE, P. E. 1978  PERTIL INCREASES GROWTH THINNED & NONTHINNED UPLAND OAK STANDS BOSTON MINS USFS SO-243 RESEARCH NOTE  PAPER NO. 189	OSTON MINS	,	×		,	
GRANEY, D. L. RESPONSE OF RED OAK & WHITE OAK TO THINNING/CENTRAL HARDWOOD POREST CONF II PROC:357-369	ANEY, D. L. RESPONSE OP RED OAK & WHITE OAK TO THINNING/PERTILIZATION IN BOSTON MTNS, CENTRAL HARDWOOD POREST CONP II PROC:357-369	TON MINS, AR					
PAPER NO. 191	PERTILIZATION PERTILIZATION			×	,	•	
GRANEY, DAVID L.  EPPECT OF THIN/PERTIL ON GROWTH UPLANI USPS SE-24 GTR, 2ND BIENNIAL SOUTHERN PAPER NO. 194	ANEY, DAVID L.  EPPECT OF THIN/PERTIL ON GROWTH UPLAND OAK STDS IN BOSTON MTS, AR, 7-YR RESULT USPS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONP PROC:269-274 PAPER NO. 194	R, 7-YR RESULT P PROC:269-274	,	×	•		
GRANEY, DAVID L.  DEVELOP OAK, ASH, CHERRY REPRODUCTION USPS SO-54 GTR, 3RD BIENNIAL SOUTHERN PAPER NO. 190	ANEY, DAVID L. ROGERSON, THOMAS L. 1984 DEVELOP OAK, ASH, CHERRY REPRODUCTION FOLLOWING THINNING & FERTILIZATION USPS SO-54 GTR, 3RD BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:171-177 PAPER NO. 190  KERTILIZATION	LIZATION P PROC:171-177 X	×				r
HALLS, LOWELL K. SCHUSTER, JOSEPH L. 1965 TREE-HERBAGE RELATIONS IN PINE-HARDWOOD PORESTS OP TEXAS JOURNAL OP PORESTRY 63(4):282-283 PAPER NO. 365	SCHUSTER, JOSEPH L. 1965 N PINE-HARDWOOD FORESTS OP TEXAS ):282-283		ı	×		ı	ı

### TIMBER MODEL - CITATIONS POR OAKS

CITATION	PRACTICE	STOCKING	SEED SAP GROWTH	POLE & SAW	GROWTH	G AND Y TABLES	ECONOMICS
HANNAH, PETER R.							
ESTIMATING SITE INDEX-WHITE/BLACK OA JOURNAL OP FORESTRY 66(5):412-417 PAPER NO. 200	ACK CAKS IN INDIANA FROM SOIL/TOPOGRAPHIC FACTOR	TOPOGRAPHIC FACTOR		r	•	,	•
HILT, DONALD E. HEIGHT PREDICTION EQUATIONS POR EVEN	MARTIN E. R EVEN-AGED UPLAND OAK STANDS						
PAPER NO. 198		,	•		×	ı	,
JOHNSON, PAUL S. JACOBS, RODNEY D. N RED OAK REGENERATION APTER PREHERBICIDED	JACOBS, RODNEY D. 1981 PTER PREHERBICIDED CLEARCUTTING & SHELTERWOOD REMOVAL	ELTERWOOD REMOVAL					
USPS NC-202 RESEARCH PAPER Paper no. 188	MULTIPLE	ı	×			•	•
LAMSON, NEIL I. EPFECT OF PERTILIZATION ON POUR SPECIES IN MATURE USPS NE POREST EXPERIMENT STATION		UNKWN APPALACHIAN HARDWOOD STANDS					
PAPER NO. 192	FERTILIZATION	×	•		•		ı
LEEFERS, LARRY A. ET AL 1987 ECOLOGICAL CLASSIPICATION SYSTEM: INPORMATION AND ECONOMICS	1987 EM: INPORMATION AND ECONOMICS						
TO BE PRESENTED AT CENTRAL HARDWOODS PAPER NO. 202	DWOODS POREST CONFERENCE, KNOXVILLE, TN (PEB/87) MULTIPLE	/ILLE, TN (PEB/87)		×	•	•	1

### TIMBER MODEL - CITATIONS FOR OAKS

		STOCKING	SEED SAP	POLE	GROWTH	G AND Y	
CITATION	PRACTICE	LEVEL	GROWTH	WAS 1	CURVES	TABLES	ECONOMICS
O'HARA, KEVIN L.  DEVELOPMENTAL PATTERNS RESIDUAL OAK & SOUTHERN JOURNAL OF APPLIED FORESTRY 1	1986 OAK/YELLOW-POPLAR REGEN APTER RELEASE (0:244-248	RELEASE					
PAPER NO. 193	COMPETITOR CONTROL		×				
T. GREEN, ALAN W. REATMENTS POR BRUSHY OLD EARCH PAPER	1963 FIELDS IN SOUTHERN ILLINOIS						
PAPER NO. 196	COMPETITOR CONTROL	•	×			1	•
SANDER, IVAN L. OAKS IN THE NORTH CENTRAL STATES USPS NC-37 GENERAL TECHNICAL REPORT	1977						
PAPER NO. 187	MULTIPLE	×	×	,	×	×	
SEIPERT, J. R. ET AL 1984 EPPECTS OP 3 LEVELS SITE PREP ON PLANTED SWAMP CHESTNUT OAK ON POOR DRAIN USPS SO-54 GTR, 3RD BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONP:53-56	1984 ED SWAMP CHESTNUT OAK ON POOR DRA SILVICULTURAL RESEARCH CONP:53-56	DRAIN SITE -56					
PAPER NO. 197	SITE PREPARATION		×		ı	•	
STEWART, RONALD (COMPILER ET AL EPFECTS OP COMPETING VEGETATION ON POREST TREES: USFS WO-43 GENERAL TECHNICAL REPORT	1984 EST TREES: A BIBLIOGRAPHY WITH ABSTRACTS	ABSTRACTS					
PAPER NO. 300	COMPETITOR CONTROL	×	×	×	×	×	၁ ရ

### TIMBER MODEL - CITATIONS FOR OAKS

CITATION	ш	STOCKING	SEED SAP GROWTH	POLE & SAW	GROWTH	G AND Y	ECONOMICS
TUBBS, CARL H.  NORTHERN HARDWOODS IN THE NORTH CENTRAL STATES  USFS NC-39 GENERAL TECHNICAL REPORT  PAPER NO. 182	1977 RAL STATES MULTIPLE	×	×	×	,	·	,
UNKNOWN MANAGEMENT OP AN OAK-TULIP POPLAR STAND ON THE MICHAUX STATE FOREST MICHAUX STATE FOREST, PRESENTED TO USDA PS REGION 9 PAPER NO. 676 PAPER NO. 676	1985 ON THE MICHAUX STATE FOREST PS REGION 9 POREST REPORT						B.C.B/C
WILDE, S. A.  THE RELATION OP SOILS AND POREST VEGETATION OP THE LAKE STATES REGION ECOLOGY XIV(2):94-105 PAPER NO. 288	1933 FION OP THE LAKE STATES REGI	NO -		,	,		

CITATION	PRACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y	ECONOMICS
ALEXANDER, E. B. ET AL 1985 COMPARISON STEINBRENNER AIR PERMEAMETER PRESSURE LOSS & SURFACE SOIL POROSITY USFS, REGION 5, EARTH RESOURCES NOTE PAPER NO. 74	1985 R PRESSURE LOSS & SURFACE SO	IL POROSITY	×		,		
ALEXANDER, ROBERT R. SILVIC SYS & CUT METHODS POR PONDEROSA FORESTS IN USFS RM-128 GENERAL TECHNICAL REPORT PAPER NO. 87	1986 FORESTS IN FRONT RANGE CTRL ROCKY MTNS MULTIPLE X	ROCKY MTNS				•	
ANDERSON, HENRY W. ET AL FORESTS & WATER: EPPECT OP POREST MGMT ON PLOODS, USPS PSW-18 GENERAL TECHNICAL REPORT PAPER NO. 719	1986 ON PLOODS, SEDIMENTATION & WATER SUPPLY GENERAL WATERSHED MGMT	WATER SUPPLY				,	,
ATZET, THOMAS AMARANTHUS, MIKE 1985 SOIL MOISTURE RETENTION PROGRAM USPS REGION 6, SISKIYOU NATIONAL POREST R6-ECOL-209-1986 PAPER NO. 703	KE 1985 F R6-ECOL-209-1986 POREST REPORT		×				
BAKER, MALCHUS B., JR. HYDROLOGIC REGIMES OF THREE VEGETATION TYPES ACROSS THE MOGOLLON RIM AM SOC CIVIL ENGINEERS PROC: HYDRO & WATER RES IN AZ & SW. VOL. 11:5 PAPER NO. 487	1981 NN TYPES ACROSS THE MOGOLLON RIM WATER RES IN AZ & SW. VOL. 11:5-12 VEGETATIVE MGMT	IM :5-12		,		ı	•

		STOCKING	SEED SAP	POLE	GROWTH	G AND Y	
CITATION	PRACTICE	LEVEL	GROWTH	& SAW	CURVES	TABLES	ECONOMICS
S	1982 IN THE BEAVER CREEK WATERSHED					! ! ! ! !	
PAPER NO. 517	GENERAL	,	•		•		
	Š						
BAKER, MALCHUS B., JR. EPPECTS OF PONDEROSA PINE TREATMENTS (	1986 ON WATER YIELD IN ARIZONA						
WATER RESOURCES RESEARCH 22(1):67-73 Paper no. 488	VEGETATIVE MGMT	,	,	,	,	,	ı
BARRETT, JAMES W. SILVICULTURE OF PONDEROSA PINE IN PACIFIC NORTHWEST: STATE OF OUR KNOWLEDGE USFS PNW-97 GENERAL TECHNICAL REPORT	1979 IFIC NORTHWEST: STATE OF OUR I	CNOWLEDGE					
PAPER NO. 86	MULTIPLE	×	×	×	×	×	,
0	1981 REST LAND						
SOUTHERN JOURNAL OP APPLIED PORESTRY OF PAPER NO. 254	5(4):216-222	,	ı	,	,	ŧ	
CARMEAN, WILLARD H.	1975						
POREST SITE QUALITY EVALUATION IN THE UNITED STATES ADVANCES IN AGRONOMY 27(1975):209-269 PAPER NO. 232	UNITED STATES		,		,		

CITATION	S PRACTICE 1	STOCKING	SEED SAP GROWTH	POLE SAW	GROWTH	G AND Y	ECONOMICS
CHRISTENSEN, M. DALE ET AL CONTROL OF ANNUAL GRASSES AND REVEGETATION IN PONDEROSA PINE WOODLANDS JOURNAL OP RANGE MANAGEMENT 27(2):143-145 PAPER NO. 329	1974 IN PONDEROSA PINE WOODLANI RANGE REHABILITATION	80.	×				
1964 METHOD FOR PREDICTING POTENTIAL HERBAGE YIELD ON BEAVER CREEK PILOT WATERSHEDS AMERICAN SOCIETY OF AGRONOMY, ASA SPECIAL PUBLICATION 5(OCT 1964):244-250 PAPER NO. 385	1964 YIELD ON BEAVER CREEK PILOT L PUBLICATION 5(OCT 1964):24 RANGE REHABILITATION	WATERSHEDS 44-250 -	,		•	•	,
CLARY, WARREN P. RELATIONSHIP OP DIPPERENT POREST PLOOR L USFS RM-123 RESEARCH NOTE PAPER NO. 383	1968 IR LAYERS TO HERBAGE PRODUCTION VEGETATIVE MGMT		,			•	
1969 INCREAS SAMPLING PRECISION POR HERBAGE VARIABLES THRU KNOWLEDGE TMBR OVERSTORY JOURNAL OF RANGE MANAGEMENT 22(3):200-201 PAPER NO. 389	1969 VARIABLES THRU KNOWLEDGE TMB 01	BR OVERSTON	, <del>,</del>		÷	•	,
CLARY, WARREN P.  CATTLE GRAZING & WOOD PRODUCTION WITH DIFPERENT BASAL AREAS OF PONDEROSA PINE JOURNAL OP RANGE MANAGEMENT 28(6):434-437  PAPER NO. 363	1975 IFPERENT BASAL AREAS OF PONI 137 VEGETATIVE MCMT	DEROSA PIN	l ω	×		•	B, C, B/C

CITATION	PRACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y	ECONOMICS
CLARY, WARREN P.  RANGE MCMT & ITS ECOL BASIS IN PONDEROSA PINE TYPE OF AZ: STATUS OF KNOWLEDGE USFS RM-158 RESEARCH PAPER	1975 EROSA PINE TYPE OF AZ: ST	ATUS OF KNOWLEDGE					
PAPER NO. 404							B, C
CLARY, WARREN P.  PACTORS APPECTING PORACE CONSUMPTION BY JOURNAL OP RANGE MANAGEMENT 31(1):9-10	CATTLE IN	1978 AZ PONDEROSA PINE FORESTS					
PAPER NO. 394	MULTIPLE				,	•	
CLAYTON, JAMES L. ET AL SOIL DISTURBANCE - PRODUCTIVITY RELATIONS IN CENTRAL IDAHO CLEARCUTS	UNKWN ATIONS IN CENTRAL IDAHO C	LEARCUTS					
PAPER NO. 151	MULTIPLE	•	×		•	•	
COCHRAN, P. H. BROCK, TERRY 1985 SOIL COMPACTION AND INITIAL HEIGHT GROWTH OF PLANTED PONDEROSA PINE USPS PNW-434 RESEARCH NOTE	Y GROWTH OP PLANTED PONDERG	SA PINE					
PAPER NO. 94	LOGGING SYSTEM		×		,	•	ı
COVINGTON, W. W. SACKETT, S. S. EPPECT OF PERIODIC BURNING ON SOIL NITROGEN CONCENTRATIONS IN PONDEROSA PINE SOIL SCIENCE SOCIETY OF AMERICA JOURNAL 50(2):452-457	S. NITROGEN CONCENTRATIONS I RNAL 50(2):452-457	N PONDEROSA PINE					
PAPER NO. 88	SITE PREPARATION	•	×	×	,		,

CITATION	PRACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y	ECONOMICS
COX, G. S.  PONDEROSA PINE PRODUCTIVITY IN RELATION TO SOIL & SOIL SCIENCE SOCIETY OF AMERICA PROC 24(1960):139-PAPER NO. 98	ET AL  ITY IN RELATION TO SOIL & LANDPORM IN WESTERN MONTANA  AMERICA PROC 24(1960):139-142  X	STERN MONTANA	,	,	,	,	,
CROUCH, GLENN L. ATRAZINE IMPROVES SURVIVAL/ FOREST SCIENCE 25(1):99-111 PAPER NO. 78	OUCH, GLENN L. ATRAZINE IMPROVES SURVIVAL/GROWTH PONDEROSA PINE THREATENED BY VEG COMPETITION FOREST SCIENCE 25(1):99-111 PAPER NO. 78	/EG COMPETITION	*				
CURRIE, PAT O. GRAZING MGMT OP PONDEROSA USPS RM-159 RESEARCH PAPER PAPER NO. 401	1975 GRAZING MGMT OP PONDEROSA PINE-BUNCHGRASS RANGES OP CENTRAL ROCKY MOUNTAINS USPS RM-159 RESEARCH PAPER PAPER NO. 401	CY MOUNTAINS	•	,		•	
DISSMEYER, GEORGE E. POSTER, BENNI SOME ECONOMIC BENEPITS OF PROTECTING USPS SO-65 GENERAL TECHNICAL REPORT PAPER NO. 289	POSTER, BENNETT  1987  PROTECTING WATER QUALITY (IN A PROCEEDINGS)  ICAL REPORT  MULTIPLE	, '	×	,		,	B,C,B/C,IRR
PFOLLIOTT, PETER P. CLARY, WARREN P. PREDICTING HERBAGE PRODUCTION PROM POREST GR PROGRESSIVE AGRICULTURE IN ARIZONA 26(3):3-5 PAPER NO. 384	OLLIOTT, PETER P. CLARY, WARREN P. 1974 PREDICTING HERBAGE PRODUCTION PROM POREST GROWTH IN ARIZONA PONDEROSA PINE PROGRESSIVE AGRICULTURE IN ARIZONA 26(3):3-5 PAPER NO. 384	EROSA PINE	,	,		,	,

CITATION	PRACTICE	STOCKING	SEED SAP GROWTH	POLE & SAW	GROWTH	G AND Y	ECONOMICS
FFOLLIOTT, PETER F. CLARY, WAR DIPP IN HERBAGE-TIMBER RELATION ON PROCRESSIVE ACRISING IN ARIZONA	REN P. 1975 SEDIMENTARY & IGNEOUS	SOILS IN AZ PONDEROSA					
PAPER NO. 396			r		ł	ı	,
FFOLLIOTT, PETER P. E	ET AL 1977						
EPFECTS OP A PRESCRIBED PIRE IN AN	THE IN AN ARIZONA PONDEROSA PINE POREST						
USFS RM-336 RESEARCH NOTE							
PAPER NO. 320	RANGE REHABILITATION				•		æ
FISKE, JOHN N.							
ESTIM EPPECT OP COMPETING PLANTS ON 6TH ANNUAL POREST VEGETATION MANAGE!	ESTIM EPPECT OP COMPETING PLANTS ON CONIPER GRWTH/YIELD-DETERMIN RELEASE NEEDS 6TH ANNUAL POREST VEGETATION MANAGEMENT CONP PROC:129-143	RELEASE NEEDS					
PAPER NO. 249	COMPETITOR CONTROL						,
FROEHLICH, H. A. E	ET AL 1986						
GROWTH OF YOUNG PINUS PON	GROWTH OF YOUNG PINUS PONDEROSA & CONTORTA ON COMPACTED SOIL IN CENTRAL WA	ENTRAL WA					
POREST ECOLOGY AND MGMT 15(1986):285-294	.5(1986):285-294						
PAPER NO. 89	SKID TRAILS	,	×		•		
PROEHLICH, HENRY A.	1979						
SOIL COMPACTION PROM LOGGING EQUIP:	ING EQUIP: EPFECTS ON GROWTH OF YOUNG PONDEROSA PINE	NDEROSA PINE					
JOURNAL OF SOIL AND WATER	JOURNAL OF SOIL AND WATER CONSERVATION (NOV-DEC 1979):276-278						
PAPER NO. 75	SKID TRAILS		×				

PRACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y TABLES	ECONOMICS
FROEHLICH, HENRY A.  EFFECT OF SOIL COMPACTION BY LOGGING ON POREST PRODUCTIVITY  BLM. CONTRACT # 53500-CT4-5(N), PORTLAND, OR  SKID TRAILS	,	×	×		,	
GARRETT, LAWRENCE D. MULTIRESOURCE RESEARCH & ITS IMPLICATIONS TO MGMT: THE BEAVER O WORKSHOP ON WILDLIPE & RANGE RES NEEDS IN N MEXICO & SW US, RIC PAPER NO. 525	1981 THE BEAVER CREEK BIOSPHERE & SW US, RIO RICO AZ: 40-44		ı			ı
GARY, HOWARD L. WATERSHED MGMT PROBLEMS & OPPORTUNITIES FOR COLORADO PRONT RANGE PONDEROSA PIN USPS RM-139 RESEARCH PAPER GENERAL WATERSHED MGMT	E PONDEROSA PI	z		ı		
GOTTPRIED, GERALD J.  CONTROL NEW MEXICAN LOCUST & EPPECT ON PLANTED PONDEROSA PINE-CENTRAL ARIZONA USPS RM-386 RESEARCH NOTE  COMPETITOR CONTROL	CENTRAL ARIZON	×	•	•	,	,
1983 APPLICATION AND INTERPRETATION OF POREST ECOSYSTEMS CLASSIPICATION PORESTLAND GRAZING, SYMPOSIUM PROC, WASHINGTON STATE UNIV EXTENSION SVC:7-14 PAPER NO. 361	TION NSION SVC:7-14	,	•			,

CITATION	PRACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y	ECONOMICS
HARRIS, GARY R. COVINGTON, W. CANADIAN JOURNAL OF POREST RESEARCH I3	COVINGTON, W. WALLACE 1983 E ON NUTRIENT CONC/STAND CROP UNDERSTORY VEG-PONDEROSA ST RESEARCH 13:501-507 SITE PREPARATION	VEG-PONDEROSA	×	; ; ; ; ; ;	, 1 1 1 1 1 1 1		
HEEDE, BURCHARD H. SEDIMENT SOURCE AREAS RELATED TO TIMBER SYMPOSIUM ON EPPECTS OP POREST LAND USE PAPER NO. 472	HARVEST ON ON EROSION LOGGING SY	1984 SELECTED ARIZONA WATERSHEDS & SLOPE STABILITY:123-130 STEM	,	,			r
HEEDE, BURCHARD H. OVERLAND PLOW & SEDIMENT DELIVERY: EXP JOURNAL OP HYDROLOGY 72:261-273 PAPER NO. 548	1984 DELIVERY: EXP WITH SMALL SUBDRAINAGE IN 61-273 ROADS	SW PONDEROSA				,	,
HEIDMANN, L. J. ESTABLISHING NATURAL REGENERATI. JOURNAL OF PORESTRY 80(2):77-79 PAPER NO. 91	IDMANN, L. J. ET AL 1982 ESTABLISHING NATURAL REGENERATION OF PONDEROSA PINE IN CENTRAL ARIZONA JOURNAL OF PORESTRY 80(2):77-79 PAPER NO. 91	RI ZONA	,				၁ ရ
HEIDMANN, L. J. PERTILIZATION INCREASE CONE PRODUCT IN FOREST SCIENCE 30(4):1079-1083 PAPER NO. 82	1984 NE PRODUCT IN 55-YR-OLD PONDEROSA STAND IN CENTRAL A2 -1083 FERTILIZATION	IN CENTRAL AZ					

CITATION	PRACTICE	STOCKING	SEED SAP	POLE SAW	GROWTH	G AND Y	ECONOMICS
HEIDMANN, L. J.  HEAVY FERT INCREASE DIAMETER GROWTH SLIGHTLY IN 55-YR-OLD PONDEROAS PINE STAND USFS RM-452 RESEARCH NOTE	1985 4 SLIGHTLY IN 55-YR-OLD PONDEROAS	PINE STAND	; 	; ; ; ; ; ; ;		 	1 1 1 1 1 1 1 1 1
PAPER NO. 83	PERTILIZATION	•		×	ı	,	
HEIDMANN, L. J. PONDEROSA PINE REGENERATION IN THE SOUTHWEST SOCIETY OF AMERICAN PORESTERS NATIONAL CONVE PAPER NO. 95	1985 SOUTHWEST ONAL CONVENTION PROC:228-232 MULTIPLE		•	ı	•	ı	۵, و
HELMS, J. A.  EPFECTS OF SOIL COMPACTION ON HEIGHT GROWTH OF CA WESTERN JOURNAL OF APPLIED FORESTRY 1(4):104-108 PAPER NO. 96  SKID TRA	1986 1T GROWTH OF CA PONDEROSA PINE PLANTATION Y 1(4):104-108 SKID TRAILS	LANTATION	,	,	×		,
HIBBERT, ALDEN R. MANAGING VEGETATION TO INCREASE PLOW USFS RM-66 GENERAL TECHNICAL REPORT PAPER NO. 510	1979 DW IN THE COLORADO RIVER BASIN F VEGETATIVE MGMT	•		,	,		о <b>.</b>
HIBBERT, ALDEN R. OPPORTUNITIES TO INCREASE WATER YLD IN USFS RM, TEMPE, ARIZONA PAPER NO. 514	UNKWN D IN THE SOUTHWEST BY VEGETATION MANAGEMENT VEGETATIVE MGMT	MANAGEMENT	,	,		,	ı

CITATION	PHACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y	ECONOMICS
KLOCK, GLEN O. IMPACT OF PIVE POSTFIRE SALVAGE LOGGING SYSTEMS ON JOURNAL OF SOIL AND WATER CONSERVATION 30(2):78-81	1975 NG SYSTEMS ON SOILS AND VEGETATION N 30(2):78-81	GETATION					
PAPER NO. 113	LOGGING SYSTEM		ı		•		•
LEAF, CHARLES P. WATERSHED MGMT IN CENTRAL & SOUTHERN R USFS RM-142 RESEARCH PAPER	1975 ROCKY MTNS: SUMMARY OF STA	STATUS OF KNOWLEDG					
PAPER NO. 723	GENERAL WATERSHED MGMT		•		•		,
LUCKOW, KEN TIMBER STAND NUTRIENT STATUS INVENTORY USFS MODAC NATIONAL POREST	1986 V						,
PAPER NO. 712	PERTILIZATION		×	×	•		,
MCDONALD, PHILIP M. GRASSES IN YOUNG CONIPER PLANTATIONS - NORTHWEST SCIENCE 60(4):271-278	1986 - HINDHANCE AND HELP						
PAPER NO. 367	VEGETATIVE MGMT		×	×			
MCKAY, NEIL A STOCKABILITY EQUATION FOR FOREST LAND IN SISKIYOU COUNTY, CALIFORNIA	1985 ND IN SISKIYOU COUNTY, CAL	IPORNIA					
USFS PNW-435 RESEARCH NOTE PAPER NO. 274		×					

CITATION	PRACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y	ECONOMICS
MCLEAN, ALASTAIR PRODUCING FORAGE FOR LIVESTOCK ON FOREST RANGES OR ST UNIV, COLLEGE OF AGR SCI, SYMP SERIES 2. TIMBER PRESS, BEAVERTON:175-183 PAPER NO. 382	1983 POREST RANGES YMP SERIES 2, TIMBER PRESS, BEA	VERTON: 175-183	×	,	,	,	,
MILES, SCOTT R. FERTILIZING CALIPORNIA PORESTS WITH NITROGEN USPS, REGION 5, (NOVEMBER 1983) PAPER NO. 77 PER	OBERT F. 1983 TH NITROGEN PRELIMINARY GUIDELINES PERTILIZATION -	DELINES	,	,			B, C, B/C
MYERS, CLIFFORD A. VAN DEUSEN, JAMES L. 1960 SITE INDEX OF PONDEROSA PINE IN THE BLACK HILLS FROM SOIL AND TOPOGRAPHY JOURNAL OF FORESTRY 58(6):548-555 PAPER NO. 97	VAN DEUSEN, JAMES L. 1960 PINE IN THE BLACK HILLS FROM SOIL AND TO ):548-555	)POGRAPHY		,	1		
OLIVER, WILLIAM W. POWERS, ROBERT F. 1978 GROWTH MODELS FOR PONDEROSA PINE: 1. YIELD OF UNTHINNED PLANTATIONS IN USPS PSW-133 RESEARCH PAPER PAPER NO. 750 GROWTH MODELS	OBERT F. 1978  I. YIELD OP UNTHINNED PLANTATI GROWTH MODELS	IONS IN N CALIP	×	×	×		
ORR, HOWARD K. WATERSHED MANAGEMENT IN THE BLACK HILLS: USFS RM-141 RESEARCH PAPER PAPER NO. 724	1975 HILLS: THE STATUS OP OUR KNOWLEDGE GENERAL WATERSHED MGMT	, 3DQ2				,	,

	PHACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y	ECONOMICS
OSWALD, BRIAN P. COVINGTON, W. EFFECT OF PRESCRIBED FIRE ON HERBAGE FOREST SCIENCE 30(1):22-25	N, W. WALLACE 1984  SAGE PRODUCT IN SW PONDEROSA ON SEDIMENT SOILS	SEDIMENT SOILS					
PAPER NO. 321	RANGE REHABILITATION	,	•	•	ı	ı	•
PAULSEN, HAROLD A., JR. RANGE MGMT IN CENTRAL & SOUTHERN ROCK USFS RM-154 RESEARCH PAPER	1975 Y MTNS: SUMMARY OF	STATUS OF KNOWLEDGE					
PAPER NO. 403	MULTIPLE		ı	ı	ı	i	၁' ရ
PEARSON, H. A.  EPPECTS OF WILDPIRE ON TIMBER & PORAG JOURNAL OF RANGE MANAGEMENT 25(4):250	1972 PORAGE PRODUCTION IN ARIZONA 3:250-253						
PAPER NO. 80	RANGE REHABILITATION						
PEARSON, HENRY A. JAMESON, DONA RELATIONSHIP BETWEEN TIMBER & CATTLE USFS RM, HANDOUT POR PIELD TRIPS; NOT	JAMESON, DONALD A. 1967 IBER & CATTLE PRODUCTION ON PONDEROSA PINE RANGE	E RANGE					
PAPER NO. 366							•
PEARSON, HENRY A.  ESTIM CATTLE GAINS PROM CONSUMPTION OF JOURNAL OF RANGE MANAGEMENT 25(1):18-20 PAPER NO. 392	1971 ION OP DIGESTIBLE FORAGE ON PONDEROSA PINE RNG):18-20	EROSA PINE RNG		,	•		

PEARSON, HENRY A.  CALCULATING GRAZING INTENSITY POR MAX PROPIT ON PONDEROSA PINE RANGE IN N. AZ JOURNAL OF RANCE MANACEMENT 26(4):277-278  PAPER NO. 373  POWERS, ROBERT P.  POWERS, ROBERT P.  POWERS, ROBERT F.  POWERS, ROBERT F.  POWERS, ROBERT F.  POWERS, ROBERT P.  STALLIZATION RESEARCH IN CALIFORNIA  PAPER NO. 84  POWERS, ROBERT P.  ET AL  UNKWN  ESTIMATING THE RESPONSE OF PONDEROSA PINE PORESTS TO FERTILIZATION  COPIES AVAILABLE UPON REQUEST  PAPER NO. 85  PAPER NO. 85	TRACTICE TEACH					2010017
PAPER NO. 373  POWERS, ROBERT P. JACKSON, GRANT D. 1978 PONDEROSA PINE RESPONSE TO FERTILIZATION: INPLUENCE OP 1 USFS PSW-132 RESEARCH PAPER PAPER NO. 81  POWERS, ROBERT P. POWERS, ROBERT P. POWERS, ROBERT P. POWERS, ROBERT F. ET AL ESTIMATING THE RESPONSE OF PONDEROSA PINE PORESTS TO FEL COPIES AVAILABLE UPON REQUEST PAPER NO. 85  FERTILIZATION	1973 PROPIT ON PONDEROSA PINE RANGE IN N. AZ 278	1 1 1 1 1 1 1 1				
POWERS, ROBERT P. JACKSON, GRANT D. 1978 PONDEROSA PINE RESPONSE TO PERTILIZATION: INPLUENCE OF 1 USFS PSW-132 RESEARCH PAPER PAPER NO. 81  POWERS, ROBERT F. USFS PNW-163 GENERAL TECHNICAL REPORT PAPER NO. 84  ESTIMATING THE RESPONSE OF PONDEROSA PINE PORESTS TO PEL COPIES AVAILABLE UPON REQUEST PAPER NO. 85  FERTILIZATION	SYSTEM	•	ı	i		o' <b>g</b>
ATION RESEARCH IN CALIPORNIA NERAL TECHNICAL REPORT FERTILIZA ET AL E UPON REQUEST FERTILIZA FERTILIZA	1978 CE OP BRUSH REMOVAL/SOIL TYPE					
ATION RESEARCH IN CALIPORNIA NERAL TECHNICAL REPORT FERTILIZA ET AL RESPONSE OF PONDEROSA PINE FORESTS E UPON REQUEST FERTILIZA	,		,	•		•
FERTILIZA ET AL RESPONSE OF PONDEROSA PINE PORESTS E UPON REQUEST FERTILIZA	1983					
ET AL RESPONSE OF PONDEROSA PINE PORESTS E UPON REQUEST FERTILIZA	ATION	×	*			•
		×	×			
RICH, LOWELL R. THOMPSON, J. R. 1974 WATERSHED MANAGEMENT IN ARIZONA'S MIXED CONIPER PORESTS:	1974 ORESTS: STATUS OF OUR KNOWLED	•	•			
USPS RM-130 RESEARCH PAPER Paper no. 727 General Watehshed mgmt	WATERSHED MGMT -		•	,	,	

CITATION	PRACTICE	STOCKING	SEED SAP GROWTH	POLE & SAW	GROWTH	G AND Y	ECONOMICS
RIITTERS, KURT  DYNAMIC PROGRAMMING OPTIMIZATION TIMBER PRODUCTION  FOREST SCIENCE 28(3):517-526  VEGETATIVE	1982 PRODUCTION & GRAZING IN PONDEROSA PINE VEGETATIVE MANAGEMENT	ONDEROSA PINE				,	<b>.</b>
RYAN, MICHAEL G.  EPPECT PRESCRIBED BURN IN PONDEROSA ON USFS RM-464 RESEARCH NOTE PAPER NO. 79	W. WALLACE 1986 ON INORGANIC N CONCENTRATION-MINERAL SOIL SITE PREPARATION	MINERAL SOIL	×	×	,		r
1984 Observation on natural regen in ponderosa pine following prescribed fihe in az Usfs rm-435 research note Paper no. 90	1984 SSA PINE FOLLOWING PRESCRIBI SITE PREPARATION	IED FIRE IN A	×		÷	,	
SHEPPERD, WAYNE D. MCELDERRY, SUE E. 1986 TEN-YEAR RESULTS OF A PONDEROSA PINE PROGENY TEST IN THE WESTERN JOURNAL OP APPLIED FORESTRY 1(3):79-83 PAPER NO. 93	E. 1986 ROGENY TEST IN THE BLACK HILLS 3):79-83	ILLS	×			•	,
SMITH, DWIGHT R. EFFECTS OP CATTLE GRAZING ON A PONDEROSA PINE-BUNCHGRASS RANGE IN COLORADO USFS TECHNICAL BULLETIN 1371 PAPER NO. 412	1967 DSA PINE-BUNCHGRASS RANGE IN GHAZING SYSTEM	N COLORADO					

CITATION	PRACTICE	STOCKING	SEED SAP	POLE SAW	GROWTH	G AND Y	ECONOMICS
STEWART, RONALD (COMPILER ET AL  EPPECTS OF COMPETING VEGETATION ON POREST TREES: USPS WO-43 GENERAL TECHNICAL REPORT	<	1984 BIBLIOGRAPHY WITH ABSTRACTS					
PAPER NO. 300	COMPETITOR CONTROL	×	×	×	×	×	.: B.C
TAPPEINER II, J. C. ET AL PART 2, PACIPIC COAST, THE NEXT 30 YEARS JOURNAL OP PORESTRY 84(5):37-46	1986 - SILVICULTURE -	THE PAST 30 YEARS					
PAPER NO. 248	MULTIPLE		ı			ı	·
TIEDEMANN, ARTHUR R. KLOCK, GLEN O. 1ST-YR VEG APTER PIRE, RESEEDING, PERTILIZATION ON USPS PNW-195 RESEARCH NOTE	I O. PERTILIZATION ON ENTIAT EXPER	1973 ENTIAT EXPERIMENTAL POREST					
PAPER NO. 130	MULTIPLE			ı	•	ı	
TURNER, JAMES M. LARSON, PREDERIC R. 1974 COST ANALYSIS OF EXPERIMENTAL TREATMENTS ON PONDEROSA PINE WATERSHEDS USPS RM-116 RESEARCH PAPER	DERIC R. 1974 MENTS ON PONDEROSA PINE WATE	RSHEDS					
PAPER NO. 99	LOGGING SYSTEM	•				,	O
WARD, TIMOTHY J.  SEDIMENT PROM MANAGED PINE WATERSHED CONP PROC SPONSORED BY IRRIG & DRAIN PAPER NO. 474	BAKER, MALCHUS B., JR. 1984  NE WATERSHED IN NORTHERN CENTRAL ARIZONA  RRIG & DRAIN DIV, AM SOC CIV ENGINEERS:552-558  LOGGING SYSTEM	A 552-558	•	ı	•	•	·

CITATION	PRACTICE	STOCKING	SEED SAP POLE GROWTH & SAV	POLE & SAW	GROWTH	GROWTH G AND Y CURVES TABLES	ECONOMICS
WITTENKAMP, R. 1964 EFFECT OF CULTIVATION ON THE GROWTH OF RED PINE PLANTATIONS JOHNNAL OF FORESTRY (JAN 1964) 35-37	OP RED PINE PLANTATIONS						
PAPER NO. 209	COMPETITOR CONTROL	,			•		ì
ZINKE, PAUL J.  SITE QUALITY DOUG-PIR/PONDEROSA PINE IN NW CA AS RELATED ' SOCIETY OF AMERICAN PORESTERS MEETING PROC (1958):167-171 PAPER NO. 142	1958 IN NW CA AS RELATED TO CLIMATE, TOPO,SOIL PROC (1958):167-171	. торо, soll	,			•	

#### TIMBER MODEL - CITATIONS POR RED PINE

	PRACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y	ECONOMICS
ALBAN, DAVID H.  HEIGHT GROWTH OF RED PINE ON FINE-TEXTURED SOILS USFS NC-249 RESEARCH PAPER PAPER NO. 215	PRETTYMAN, DONALD H. 1984 NE ON PINE-TEXTURED SOILS PER	,		,	×		
BENZIE, JOHN W. RED PINE IN THE NORTH CENTRAL STATES USFS NC-33 GENERAL TECHNICAL REPORT PAPER NO. 208	1977 NTES MULTIPLE	×			×	×	,
BUCHMAN, ROLAND G. SURVIVAL PREDICTIONS FOR MAJOR LAKE STATES TREE SPECIES USPS NC-233 RESEARCH PAPER PAPER NO. 212	1983 NKE STATES TREE SPECIES	×	×	,	ı	ı	,
CARMEAN, WILLARD H. POREST SITE QUALITY EVALUATION IN THE ADVANCES IN AGRONOMY 27(1975):209-269 PAPER NO. 232	1975 1-269			,		1	
HILT, DONALD E. OAKSIM: INDIVIDUAL-TREE GROWTH & YIELD USPS NE-562 RESEARCH PAPER PAPER NO. 679	1985 YIELD SIMULATOR FOR MANAGED, EVEN-AGED, UPLAN COMPUTER PROGRAMS	VEN-AGED, UPLAN X	ı	,	1	×	

#### TIMBER MODEL - CITATIONS FOR RED PINE

CITATION	PRACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y	ECONOMICS
HILT, DONALD E. USER'S GUIDE TO OAKSIM, INDIVIDUAL-T USFS NE-104 GENERAL TECHNICAL REPORT PAPER NO. 680	LT, DONALD E.  USER'S GUIDE TO OAKSIM, INDIVIDUAL-TREE GROWTH & YIELD SIMULATOR POR MANAGED USFS NE-104 GENERAL TECHNICAL REPORT  COMPUTER PROGRAMS  X	OOR MANAGED,				 	
IYER, J. G. WEEDS ON PLAINPIELD & HIAWATHA SANDY UNIV OF WISCONSIN, SCHOOL OF NATURAL PAPER NO. 211	UNKWN SOILS OF WISCONSIN, RESOURCES, FORESTRY COMPETITOR CONTR	THEIR IMPACT ON REFOR RESEARCH NOTES 189 OL					
LOTHNER, DAVID C. BRADLEY, DENNIS P. 1984 A NEW LOOK AT RED PINE PINANCIAL RETURNS IN THE LAKE STATES USFS NC-246 RESEARCH PAPER PAPER NO. 222	BRADLEY, DENNIS P. 1984 INANCIAL RETURNS IN THE LAKE STATES ER			,	,		B, C, IRR
LUNDGREN, ALLEN L. EPPECT INITIAL NUMBER OP TREES/AC & USFS NC-193 RESEARCH PAPER PAPER NO. 214	1981 AC & THINNING DENSITIES ON TIMBER YLD, RED PINE	'LD, RED PINE X		,	×	,	,
MINER, CYNTHIA L. STEMS: A NONTECHNICAL DESCRIPTION FOR FORESTERS USPS NC-252 RESEARCH PAPER PAPER NO. 678	WALTERS, NANCY R. SCRIPTION FOR FORESTERS FR COMPUTER PROGRAMS	×			,	×	

#### TIMBER MODEL - CITATIONS FOR RED PINE

CITATION	PRACTICE	STOCKING	SEED SAP	POLE SAW	GROWTH	G AND Y TABLES	ECONOMICS
OTTAWA NATIONAL POREST POREST REPORT USPS REGION 9 PAPER NO. 681	1987 Forest Report	,	,		,	,	B, C, B/C
RAWINSKI, JOHN J. SOIL PROPERTIES RELATED TO CONIPEROUS USPS NC-254 RESEARCH NOTE PAPER NO. 213	1980 SEEDLING HEIGHT GROWTH IN N. WISCONSIN	WISCONSIN	×				
SANDER, IVAN L. OAKS IN THE NORTH CENTRAL STATES USPS NC-37 GENERAL TECHNICAL REPORT PAPER NO. 187	1977 MULTIPLE	×	×		×	×	
ST. CLAIR, JOHN BRADLEY ECONOMIC EVALUATION OF LAKE STATES TREE IMPROVEMENT PROGRAMS MASTERS THESIS, UNIV OF WISCONSIN-MADISON PAPER NO. 223	1984 E IMPROVEMENT PROGRAMS SON	•				•	B, C, B/C, 1RR
STEWART, RONALD (COMPILER ET AL EPPECTS OP COMPETING VEGETATION ON POREST TREES: USPS WO-43 GENERAL TECHNICAL REPORT PAPER NO. 300	1984 EST TREES: A BIBLIOGRAPHY WITH ABSTRACTS COMPETITOR CONTROL X	TH ABSTRACTS	×	×	×	×	s, c

#### TIMBER MODEL - CITATIONS POR RED PINE

CITATION	PRACTICE	STOCKING	SEED SAP	POLE SAW	GROWTH	G AND Y	ECONOMICS
UNKNOWN FOREST REPORT USPS REGION 9 PAPER NO. 677	UNKWN FOREST REPORT	×		,	,	×	,
WILDE, S. A. THE SOIL-AMELIORATING EFFECT OF JACK PINE AND RED RECENT ADVANCES IN BOTANY, UNIV OF TORONTO PRESS, PAPER NO. 218	1961 OF JACK PINE AND RED PINE PLANTATIONS IIV OF TORONTO PRESS, CANADA				•		
WILDE, S. A. CHANGES IN SOIL PRODUCTIVITY INDUCED BY SOIL SCIENCE 97(4):276-278 PAPER NO. 217	1964 Induced by Pine Plantations					•	
WILDE, S. A. GROWTH RED PINE PLANTATION IN RELATION POREST SCIENCE 10(4):463-470 PAPER NO. 219	1964 I RELATION TO PERTILITY OF NON-PHREATIC SANDY SOIL	C SANDY SOIL			×		
WILDE, S. A.  EPPECT OF DIPP METHODS TREE PLANTING ON JOURNAL OF FORESTRY 65(2):99-101  PAPER NO. 220	VOIGT, G. K. FREE PLANTING ON SURVIVAL/GROWTH OF PINE ON CLAY SOILS (2):99-101	CLAY SOILS	×	,			,

#### TIMBER MODEL - CITATIONS FOR RED PINE

		STOCKING	SEED SAP	POLE	GROWTH	G AND Y	
CITATION	PRACTICE	LEVEL	GROWTH	WAS 2	CURVES	TABLES	ECONOMICS
WILDE, S. A. WEEDS AS A FACTOR DEPRESSING POREST	1968 GROWTH		 	1 1 1 1 1 1 1	; ; ; ; ; ; ; ; ;		1 1 1 1 1 1 1 1 1
WEED RESEARCH 8(3):196-204 PAPER NO. 210	04 COMPETITOR CONTROL	,		×	,	,	,
WILDE, S. A. SOILS AND POREST GROWTH: THEIR RELABIO SCIENCE (JAN 15, 1970):101-102 PAPER NO. 206	LDE, S. A. SOILS AND POREST GROWTH: THEIR RELATIONSHIP IN TERMS OF REGRESSION ANALYSIS BIO SCIENCE (JAN 15, 1970):101-102 PAPER NO. 206	ANALYSIS					,
WILDE, S. A. GROWTH POTENTIAL OF WISCONSIN NATIVE WISCONSIN ACADEMY OF SCIENCES, ARTS PAPER NO. 216	1970 ONSIN NATIVE PINES ON WEED-INVADED SOILS ENCES, ARTS & LETTERS 58(1970):197-202			,			



CITATION	PRACTICE	LEVEL	GROWTH	WAS 4	CURVES	TABLES	ECONOMICS
BRENDEMUEHL, R. H.  OPTIONS FOR MANAGEMENT OF SANDHILL FOREST LAND SOUTHERN JOURNAL OF APPLIED FORESTRY 5(4):216-7	1981 SANDHILL FOREST LAND D FORESTRY 5(4):216-222						
HEBB, EDWIN A.	1981						
CHOCTAWHATCHEE SAND PINE GROWTH ON A SOUTHERN JOURNAL OF APPLIED PORESTRY	ROWTH ON A CHEMICALLY PREPARED SITE10-YR RESULTS D PORESTRY 5(4):208-211	10-YR RESULTS					
PAPER NO. 244	SITE PREPARATION	1	1	•		1	1
SCHUMACHER, F. X. COLLE, T. S. GROWTH AND YIELDS OF NATURAL STANDS OF THE PUBLISHED BY T. S. COLLE, INC., DURHAM, N.C.	HUMMACHER, P. X. COLLE, T. S. 1960 GROWTH AND YIELDS OF NATURAL STANDS OF THE SOUTHERN PINES PUBLISHED BY T. S. COILE, INC., DURHAM, N.C.						
PAPER NO. 283		×	,			×	•
STEWART, RONALD (COMPILER ET AL EPPECTS OF COMPETING VEGETATION ON USPS WO-43 GENERAL TECHNICAL REPORT	EWART, RONALD (COMPILER ET AL EPPECTS OP COMPETING VEGETATION ON POREST TREES: A BIBLIOGRAPHY WITH ABSTRACTS USPS WO-43 GENERAL TECHNICAL REPORT	WITH ABSTRACTS					
PAPER NO. 300	COMPETITOR CONTROL	×	×	×	×	×	B. C.



	PRACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y	ECONOMICS
ALLEN, H. LEE BALLARD, RUSS FOREST FERTILIZATION OF LOBLOLLY PINE N. CAROLINA STATE POREST PERTILIZATION PAPER NO. 4	1983 COOPERATIVE, REPORT # 14 FERTILIZATION		,	×	,	,	
ANDERSON, HENRY W.  PORESTS & WATER: EFFECT OF POREST MGMT ON FLOODS, USFS PSW-18 GENERAL TECHNICAL REPORT  PAPER NO. 719  GENERAL	1986 ON FLOODS, SEDIMENTATION & WATER SUPPLY GENERAL WATERSHED MGMT	WATER SUPPLY	,				
BALMER, WILLIAM E.  EARLY CONSIDERATIONS IN PINE MANAGEMENT USFS POREST MANAGEMENT BULLETIN, SE ARE PAPER NO. 10	HAMLIN L. 1975 MENT AREA (OCTOBER) MULTIPLE		×			r	
BARNES, ROBERT L. SOIL PACTORS RELATED TO GROWTH AND YIELD OF FLORIDA AGRICULTURAL STATION BULLETIN 559 PAPER NO. 179	ARLES W. YIELD OP SLASH PINE PLANTATIONS IN 559	, a	×				,
BRENDEMUEHL, R. H. OPTIONS FOR MANAGEMENT OF SANDHILL FOREST LAND SOUTHERN JOURNAL OF APPLIED FORESTRY 5(4):216-222 PAPER NO. 254	1981 POREST LAND Y 5(4):216-222	,	,		t.	•	,

TIMBER MODEL - CITATIONS FOR SLASH PINE

CITATION		STOCKING	SEED SAP	POLE SAW	GROWTH	G AND Y	
BRENDEMUEHL, R. H. LOSS OP TOPSOIL SLOWS SLASH PINE USFS SO-53 RESEARCH NOTE PAPER NO. 176	LOSS OP TOPSOIL SLOWS SLASH PINE SEEDLING GROWTH IN FLORIDA SANDHILLS USFS SO-53 RESEARCH NOTE PAPER NO. 176		*	,	,	2 3 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	
BROERMAN, P. S. ET AL SITE PREPARATION AND SLASH PINE PRODUCTIVITY THE MANAGED SLASH PINE ECOSYSTEM PROC (JUNE 1981):131-149 PAPER NO. 170	1981 PROC (JUNE 1981):131-149 SITE PREPARATION		×	×			,
CAMPBELL, T. E. SPOT SEEDING IS EPPECTIVE AND INE: USPS SO-34 GTR, 1ST B1ENNIAL SOUTI	1980 SPOT SEEDING IS EPPECTIVE AND INEXPENSIVE FOR REFORESTING SMALL ACREAGES USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONP PROC:50-53 PAPER NO. 47	eages 100:50-53 X	×		,		

CARMEAN, WILLARD H.

POREST SITE QUALITY EVALUATION IN THE UNITED STATES
ADVANCES IN AGRONOMY 27(1975):209-269
PAPER NO. 232

COMERFORD, N. B. ET AL
ADVANCES IN POREST FERTILIZATION ON THE SE COASTAL PLAIN
USFS PNW-163 GENERAL TECHNICAL REPORT (DEC 1983):370-378
PAPER NO. 160
FEHTILIZATION

		STOCKING	SEED SAP	POLE	GROWTH	G AND Y	
CITATION	PRACTICE	LEVEL	GROWTH	& SAW	CURVES	TABLES	ECONOMICS
CRUTCHFIELD, DOUGLAS M.  FERTILIZATION - EPPECT ON PRODUCTIVITY!  WESTVACO CORP, GEORGETOWN, SOUTH CAROLINA  PAPER NO. 26	UNKWN NA PERTILIZATION	×	×	×	,		В, С
DERR, H. J. SITE PREPARATION IMPROVES GROWTH OF PLANUSES SO RESEARCH NOTE PAPER NO. 166	JR. UNKWN PLANTED PINES SITE PREPARATION		×	,	•		,
BIPPON, DUANE R.  RATE OF RETURN PROM FERTILIZATION OF SE USPS SE-24 GTR, 2ND BIENNIAL SOUTHERN S PAPER NO. 180	N T. SEMIMATURE SLASH PINE PLANTATIONS N SILVICULTURAL RESEARCH CONF PROC:302-310 PERTILIZATION	IONS PROC:302-310		×	,		B, C, IRR
DIPPON, DUANE R.  INPLUENCE VARIOUS ECON COMPONENT ON PROFITABILITY OF MIDROTATION FERTILIZATION USFS SO-54 GTR, 3RD BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:351-359 PAPER NO. 181	ETH R.  PROFITABILITY OF MIDROTATION FERTILIZATION  N SILVICULTURAL RESEARCH CONF PROC: 351-359  FERTILIZATION	ERTILIZATION PROC: 351-359		×	×		B, C
DISSMEYER, GEORGE E. GREIS, JOHN G. SOUND SOIL AND WATER MANACEMENT IS GOOD ECONOMICS THE MANAGED SLASH PINE ECOSYSTEM, PROC OF SYMPOSIUM (1981):194-202 PAPER NO. 161	1981 OF SYMPOSIUM (1981):194-202 SITE PREPARATION		×		,		B, C, IRR

CITATION	PHACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y TABLES	ECONOMICS
DISSMEYER, GEORGE E.  ECONOMIC IMPACTS OF EROSION CONTROL SOUTHERN FORESTRY SYMPOSIUM, ATLANTA PAPER NO. 293	1985 TROL IN FORESTS LANTA, GA, NOV 19-21, 1985 MULTIPLE	×	×	×	×	,	B , C , 1 R R
FISHER, R. F. SOILS INTERPRETATIONS FOR SILVICUSES SO-34 GTR, 1ST BIENNIAL SOUPAPER NO. 175	SHER, R. F. SOILS INTERPRETATIONS FOR SILVICULTURE IN THE SOUTHEASTERN COASTAL PLAIN USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:323-330 PAPER NO. 175	PLAIN PROC: 323-330	×	×	r		ı
FISHER, RICHARD F. ADRIAN, FREDRICK BAHIAGRASS IMPAIRS SLASH PINE SEEDLING GROWTH UNIV OF PLORIDA-SCHOOL OF POREST RES & CONS, PAPER NO. 173	ADRIAN, FREDRICK PINE SEEDLING GROWTH PPOREST RES & CONS, TREE PLANTERS' NOTES (SPRING 1981	(SPRING 1981	*		,	,	1
FISHER, RICHARD P. A PRELIMINARY GUIDE TO MAINTAINING & A REPORT FOR USPS REGION 8 PAPER NO. 243	1981 ING & IMPROVING FOREST SITE PRODUCTIVITY IN SE MULTIPLE	IVITY IN SE	,		•	ı	,
FISHER, RICHARD F.  PREDICTING TREE AND STAND RESPONSE TO CULTURAL PRACTICES 6TH NORTH AMERICAN FOREST SOILS CONF:53-65  PAPER NO. 32	1983 NSE TO CULTURAL PRACTICES CONP:53-65 MULTIPLE		×	×	•	,	

CITATION	PHACTICE	STOCKING	SEED SAP GROWTH	POLE & SAW	GROWTH	G AND Y	ECONOMICS
GRELEN, H. E.  RESPONSE OF SLASH PINE TO GRAZING PROM REGENERATION TO FIRST PULPWOOD THINNING USPS SO-54 GTR, 3RD BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONP PROC:523-527 PAPER NO. 171  GRAZING SYSTEM X	1984 REGENERATION TO FIRST PU SILVICULTURAL RESEARCH CO GRAZING SYSTEM	PULPWOOD THINNING CONP PROC:523-527 X	×	×	,	,	,
HALLS, L. K. GRAZING CAPACITY OP WIREGRASSPINE RANGES GEORGIA AGRIC EXP STA, UNIV OF GEORGIA COL PAPER NO. 413	1956 RANGES OP GEORGIA 11A COL OP AGRIC, TECHNICAL BULLETIN N.S	BULLETIN N.S. 2					<b>6</b>
HEBB, EDWIN A. SLASH PINE PRODUCTIVITY & SITE PREPARATION ON PLORIDA SANDHILL SITES USPS SE-135 RESEARCH PAPER PAPER NO. 157 SITE PREPARATION	M. TION ON PLORIDA SANDHILL SITE PREPARATION	SITES .		,	×		,
HOLLIS, CHARLES A. ET AL EPPECTS OP SOME SILVIC PRACTICES ON SO 5TH NORTH AMERICAN POREST SOILS CONP PP	1978 SOIL-SITE PROPERTIES IN LOWER COAST PLAINS PROC:585-606 LOGGING SYSTEM	ER COAST PLAINS				•	,
KUSHLA, J. D. PREDICTING SLASH PINE RESPONSE TO NITROGEN AND PHOSPHORISOIL SCIENCE SOCIETY OF AMERICA JOURNAL 44(6):1303-1306 PAPER NO. 159	S	FERTILIZATION -					

CITATION	PRACTICE	STOCKING	SEED SAP	POLE SAW	GROWTH	G AND Y	ECONOMICS
LANGDON, O. GORDON MCKEE, WILLIAN CAN PERTILIZATION OF LOBLOLLY PINE ON USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN PAPER NO. 21	NGDON, O. GORDON MCKEE, WILLIAM H., JR. 1980 CAN PERTILIZATION OP LOBLOLLY PINE ON WET SITES REDUCE THE NEED FOR DRAINAGE USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:212-218 PAPER NO. 21	DRAINAGE 10C:212-218	,	*			1 1 1 1 1 1 1 1 1
LEWIS, CLIPFORD E. CHOPPING AND WEBBING CONT USFS SE-177 RESEARCH NOTE PAPER NO. 328	1972 CHOPPING AND WEBBING CONTROL SAW-PALMETTO IN SOUTH FLORIDA USFS SE-177 RESEARCH NOTE PAPER NO. 328		,				,
LEWIS, CLIPPORD E. FORAGE YIELDS IMPROVED BY SITE PREPA SOUTHERN JOURNAL OP APPLIED PORESTRY PAPER NO. 354	WIS, CLIFPORD E. ET AL FORAGE Y SITE PREPARATION IN PINE PLATWOODS OF NORTH PLORIDA SOUTHERN JOURNAL OP APPLIED PORESTRY:181-185 PAPER NO. 354	TH PLORIDA			•	,	•
LUNDGREN, GWYNNE K.  AN ECONOMIC ANALYSIS OF POREST GRAZI SOUTHERN JOURNAL OF APPLIED PORESTRY PAPER NO. 352	NDGREN, GWYNNE K. ET AL AN ECONOMIC ANALYSIS OP POREST GRAZING ON POUR TIMBER MANAGEMENT SITUATIONS SOUTHERN JOURNAL OP APPLIED PORESTRY 7(3):119-124 PAPER NO. 352	UATIONS	•	×			B, C, 1RR
MCGEE, CHARLES E. SOIL SITE INDEX POR GEORGIA SLASH PI USFS SE-119 STATION PAPER PAPER NO. 178	1961 Eorgia Slash Pine Aper	,	,			,	

CITATION	PRACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y TABLES	ECONOMICS
MCKEE, WILLIAM H.  CHANGES IN SOIL PERTILITY POLLOWING PRESCRIBED BURNING COASTAL PLAIN PINE USFS SE-234 RESEARCH PAPER  SITE PREPARATION	1982 ING PRESCRIBED BURNING COASTAL P SITE PREPARATION	PLAIN PINE SITE	,				•
MCKEE, WILLIAM H., JR. LEWIS, CLIPPORD E.  INPLU OF BURN/GRAZ ON SOIL NUTRIENT PROP & TREE GROWTH-COAST PLAIN APTER 40 YR  USPS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONP PROC:79-86  PAPER NO. 102	LEWIS, CLIFFORD E. 1982 SIL NUTRIENT PROP & TREE GROWTH-COAST PLANINAL RESEARCH COINNAL RESEARCH COINIAL SOUTHERN SITE PREPARATION	AIN APTER 40 YE NP PROC:79-86					
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MORRIS, LARRY A. WINDROW COMPOSITION IMPAC REPORT 6(3) PAPER NO. 167	1981 SITE PREPARATION		×	r	•	•	
MORRIS, LAWRENCE A. ET AL DISPLACEMT OF PLATWD FOREST SOIL SCIENCE SOCIETY OF AMERICA JOURNAL 47(1983):591-594 PAPER NO. 165	1983 DROWS DURING SITE PREPARATION OI JOURNAL 47(1983):591-594 SITE PREPARATION	P PLATWD FOREST	,	•	•		

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NEARY, D. G. SITE PREPARATION 6TH NORTH AMERICA PAPER NO. 13	ARY, D. G.  SITE PREPARATION AND NUTRIENT MANAGEMENT IN SOUTHERN PINE PORESTS 6TH NORTH AMERICAN POREST SOILS CONP:121-144  PAPER NO. 13	,	*			,	
OUTCALT, KENNETH W. MECH SITE PREP IM USPS SE-24 GTR, 2 PAPER NO. 172	1982 MECH SITE PREP IMPROVES GROWTH GENETICALLY IMPROVED/UNIMPROVE SLASH PINE IN USPS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONP PROC:11-13 PAPER NO. 172	ASH PINE IN PL P PROC:11-13	×		•		
PEARSON, H. A. FORAGE & CATTLE R JOURNAL OF RANGE PAPER NO. 405	ARSON, H. A. PHITAKER, L. B. 1974 FORAGE & CATTLE RESPONSES TO DIPP GRAZING INTENSITIES ON SOUTHEF JOURNAL OP RANGE MANAGEMENT 27(6):444-446 PAPER NO. 405	SOUTHERN PINE RIDGE	×	•	· 1		۵
PEARSON, HENRY A. POREST AND RANGE INTERACTIONS USPS SO-34 GTR, 1ST BIENNIAL. PAPER NO. 360	ARSON, HENRY A. Porest and range interactions USPS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:339-342 Paper no. 360	P PROC:339-342	×				B, C, IRR
PEARSON, HENRY A. POREST GRAZING IN OR ST UNIV, COLLE PAPER NO. 358	ARSON, HENRY A. POREST GRAZING IN THE SOUTHERN UNITED STATES OR ST UNIV, COLLEGE OP AGR SCI, SYMP SERIES 2. TIMBER PRESS, BEAVERTON:247-260 PAPER NO. 358	/ERTON:247-260	×				æ

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PIENAAR, LEON V.  RESPONSE TO CONTROL OF COMPETING VEG SOUTHERN JOURNAL OF APPLIED FORESTRY PAPER NO. 164	VEG IN SITE-PREPARED SLASH PINE PLANTATIONS TRY 7(1):38-45 COMPETITOR CONTROL	PLANTATIONS	,	×	,	,	,
PRITCHETT, W. L. POREST PERTILIZATION IN THE U.S. SOUTHEAST 4TH NORTH AMERICAN POREST SOILS CONP PROC:	H. SOUTHEAST ONP PROC: 467-476 FERTILIZATION		×		,	,	
PRITCHETT, W. L.  LONG-TERM RESPONSE PHOSPHORUS PERTILI SOIL SCIENCE SOCIETY OF AMERICA JOURN PAPER NO. 158	1982 TILIZATION ON SELECTED SE COASTAL PLAIN SOILS OURNAL 46(1982):640-643 PERTILIZATION	L PLAIN SOILS			,		,
SARIGUMBA, T. I.  RESPONSE OP SLASH PINE TO DIPPERENT SPACINGS AND SOUTHERN JOURNAL OP APPLIED PORESTRY:91-94 PAPER NO. 162	G. A. NT SPACINGS AND SITE-PREPARATION TREATMENTS TRY:91-94 SITE PREPARATION X	TREATMENTS *	•	ı	×	•	•
SARIGUMBA, TERRY I. SUSTAINED RESPONSE OF PLANTED SLASH PINE TO SPACING AND SITE USPS SO-54 GTR, 3RD BIENNIAL SOUTHERN SILVICULTURAL RESEARCH PAPER NO. 177		PREPARATION CONP PROC:79-84 X		•	1		,

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SARIGUMBA, TERRY I.  PERTILIZATION OF YOUNG PLANTATIONS I COPIES AVAILABLE UPON REQUEST  PAPER NO. 169	UNKWN IN THE SOUTHEAST FERTILIZATION	,	×	×		,	,
SAUCIER, JOSEPH R. ET AL GREEN WEIGHT, VOLUME, BOARD-POOT AND GEORGIA PORESTRY COMMISSION, GEORGIA PAPER NO. 235	1981 D CORD TABLES FOR MAJOR SOUTHERN PINES A FOREST RESEARCH PAPER 19	UTHERN PINES SPP	,		•	×	
SCHUMACHER, P. X. COILE, T. S. GROWTH AND YIELDS OP NATURAL STANDS OF THE S PUBLISHED BY T. S. COILE, INC., DURHAM, N.C. PAPER NO. 283	OP THE SOUTHERN PINES HAM, N.C.	×		•		×	•
SHOULDERS, EUGENE TERRY, T. A.  DEALING WITH SITE DISTURBANCES FROM HARVESTING & SITE SYMPOSIUM ON PRINCIPLES OF MAINT PRODUCTIVITY ON PREP PAPER NO. 269	1978 HARVESTING & SITE PHEP IN DDUCTIVITY ON PREP SITE PRE MULTIPLE	1978 SITE PHEP IN LOW COAST PLAIN PREP SITE PROC, MS STATE UNIV	,				,
STEWART, RONALD (COMPILER ET AL EPPECTS OF COMPETING VEGETATION ON F USFS WO-43 GENERAL TECHNICAL REPORT PAPER NO. 300	1984 FOREST TREES: A BIBLIOGRAPH COMPETITON CONTROL	1984 A BIBLIOGRAPHY WITH ABSTRACTS ON CONTROL X	*	×	×	×	В, С

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SWINDEL, BENEE P.  BULTI-RESOURCE EPPECTS OP HARVEST, SITE PREPARATION & PLANTING IN PINE FLATWDS SOUTHERN JOURNAL OP APPLIED PORESTRY 7(1):6-15 PAPER NO. 355  VEGETATIVE MGMT	1983  E PREPARATION & PLANTING IN P  (I):6-15  VEGETATIVE MGMT	INE FLATWDS	,	,	,	,	
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THILL, RONALD E. WOLTERS, GALE L. CATTLE PRODUCTION ON A SOUTHERN PINE-HARDWOOD FOREST RANGELANDS 1(2):60-61 PAPER NO. 359 VEGETATIVE	L. IARDWOOD FOREST VEGETATIVE MGMT			,	ı	,	ე <b>' g</b>
TIARKS, ALLAN E. EPFECT OP SITE PREP AND PERTILIZATION O USPS SE-24 GTR, 2ND BIENNIAL SOUTHERN S PAPER NO. 174	1982 ON SLASH PINE GROWING ON GOOD SITE SILVICULTURAL RESEARCH CONP PROC:34-39 MULTIPLE	. SITE .ROC: 34-39	×		•	,	
TIPPIN, TOM (EDITOR) PROCEEDINGS: SYMPOSIUM ON PRINCIPLES OP USFS SE AREA STATE & PRIVATE PORESTRY, A PAPER NO. 234	1978 MAINT PRODUCTIVITY ON PREPARED SITES ATLANTA, GEORGIA MULTIPLE	RED SITES			•	×	B, C

CITATION	PRACTICE	STOCKING	SEED SAP	POLE & SAW	GROWTH	G AND Y	ECONOMICS
WALKER, LAURENCE C. PERKINS, HENRY P FOREST SOILS AND SILVICULTURE IN GEORGIA SCHOOL OF FORESTRY & COLLEGE OF AGRIC, U PAPER NO. 233	LKER, LAURENCE C. PERKINS, HENRY P. 1958 FOREST SOILS AND SILVICULTURE IN GEORGIA SCHOOL OP FORESTRY & COLLEGE OP AGRIC, UNIV OF GEORGIA-ATHENS, REPORT 4 PAPER NO. 233	EPORT 4			×	,	
WILHITE, L. P. BEDDING EFFECTS IN MATURING SLASH PINE STANDS SOUTHERN JOURNAL OF APPLIED FORESTRY:24-27 PAPER NO. 163	JONES, E. P., JR. RING SLASH PINE STANDS LIED FORESTRY:24-27 SITE PREPARATION	×	×	,	×	,	
WILLISTON, HAMLIN L. RELEASE CUTTING IN SOUTHERN PORESTS: USPS POREST MGMT BULLETIN (NOV 1977) PAPER NO. 104	1977 HERN PORESTS: ECONOMICAL AND EFFECTIVE STAND CONVERSION IN (NOV 1977) COMPETITOR CONTROL	AND CONVERSION	×	,	,	,	,
WILLISTON, HAMLIN L. GROWTH OF UNDERSTOCKED SOUTHERN PINE USPS FOREST MANAGEMENT BULLETIN, SE / PAPER NO. 11	1978 SOUTHERN PINE STANDS SULLETIN, SE AREA (FEBRUARY) COMPETITOR CONTROL	×	,			×	,
WOLTERS, GALE L. SOUTHERN PINE OVERSTORIES INFLUENCE HERBA JOURNAL OF RANGE MANAGEMENT 26(6):423-426 PAPER NO. 364	1973 SS INFLUENCE HERBAGE QUALITY MENT 26(6):423-426 VEGETATIVE MGMT	,		×			







